3.6kWh All In One

SAMSUNG SDI

Installation Manual

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1 About this Manual

1.1 Valid Range

This is the installation manual for the 3.6 kWh all in one system. Users of this device must refer to the user's manual, installation manual.

1.2 Target Group

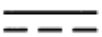
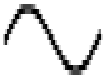
This installation manual applies only to the Samsung 3.6kWh All in One.

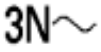
1.3 Manual Storage

The user's manual and installation manual can be downloaded from the product download section at "https://myess.samsungsdi.com". Specification of the product can be change without any notice to customers for the system improvement.
And software can be update without any notice to customers via internet

1.4 Symbol Used

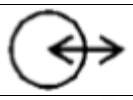
Symbols	Meaning
	CAUTION!
	CAUTION represents hazardous situations which can cause light injuries if not avoided.
	NOTICE!
	NOTICE represents the situations which can cause damage to property if not avoided.
	Information
	"INFORMATION" provides tips that are valuable for optimum installation and operation of the product.

Number	Symbol	Description
1		Direct current
2		Alternating current

3		Both direct and alternating current
4		Three-phase alternating current
5		Three-phase alternating current with neutral conductor
6		Earth terminal
7		Protective conductor terminal

Number	Symbol	Description
8		Frame or chassis terminal
9		Refer to the operating instructions
10		On (supply)
11		Off (supply)
12		Equipment protected throughout by double insulation or reinforced insulation
13		Caution, risk of electrical shock
14		Caution hot surface

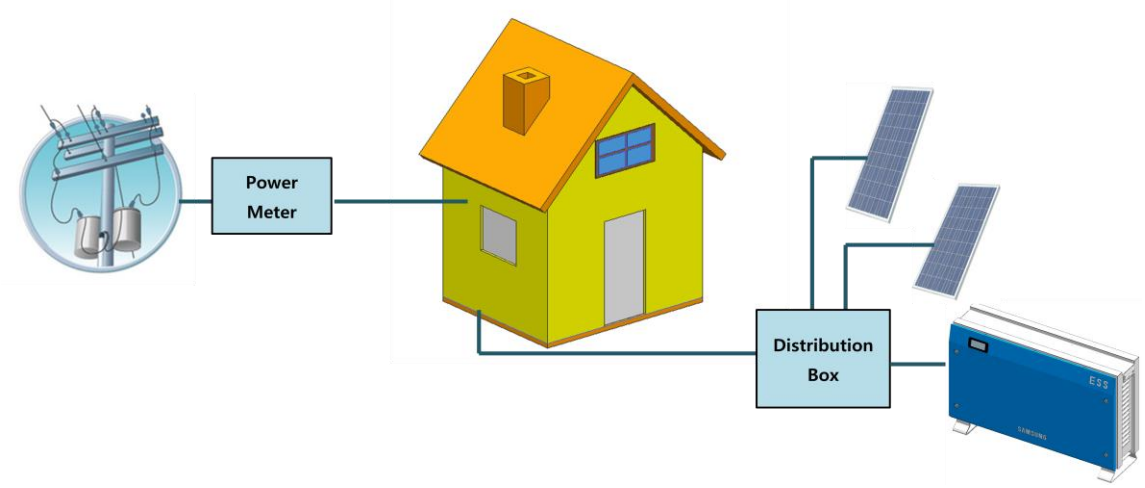
Number	Symbol	Description
15		Caution, risk of danger
16		In position of a bi-stable push control
17		Out position of a bi-stable push control
18		Input terminal or rating
19		Output terminal or rating

20		Bidirectional terminal rating
21		Caution, risk of electrical shock, Energy storage timed discharge
22		Caution risk of hearing damage. Wear hearing protection
23		Do not dispose of the inverter with household wastes. For detailed disposal information, please refer to the installation manual provided.
24		CE indication. The relevant equipment complies with the requirements in the EC guidelines.

2 Safety

2.1 Intended Usage

The original purpose of this device is for residential grid-connected single-phase system with solar energy sources and Li-Ion Battery energy storage. The basic operations are as follows.
3.6kWh All in One system uses solar energy power connected to the input/output terminal installed on the side of the device to charge the Li-Ion battery energy storage or to supply to the household load, and also to convert the direct current (DC) electricity of the battery to alternating current (AC) to discharge as household single-phase load or electric system.
It is recommended not to use this device for other than the purpose described in this manual. The substitute use of this device, random change, and use of components other than sold or recommended by Samsung SDI will nullify the product guarantee. For example, Samsung Li-Ion battery energy storage should not be replaced by other manufacturer's battery storages. For inquiries on the proper use of this device, please contact the Samsung SDI Service line (Refer to the contact or www. samsungsdi. com).



Samsung 3.6kWh All in One

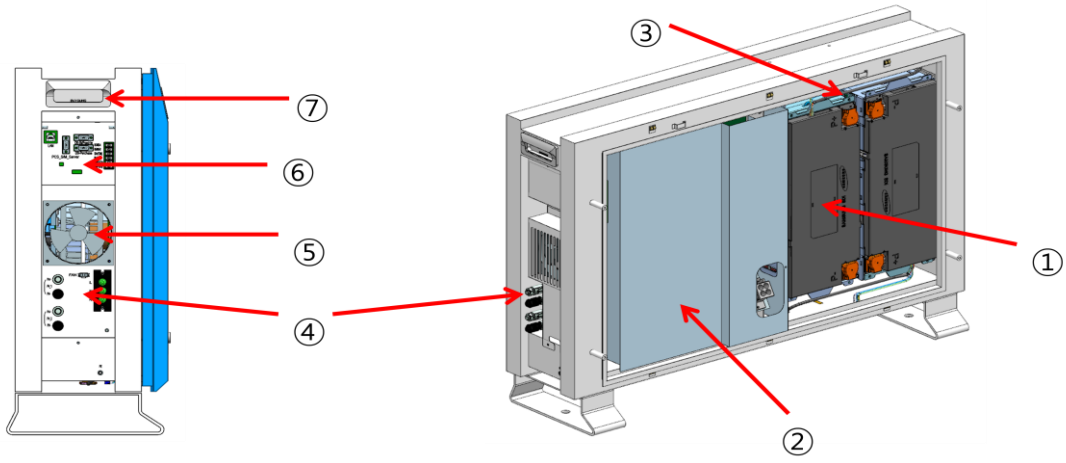
2.2 Safety Precautions

	CAUTION! High voltages in power conditioning circuits. Lethal hazards resulting in electric shock and burns. All works on the PV modules, inverter, converters and battery systems must be carried out by qualified personnel only. Wear rubber gloves, protective glasses and boots when working on high voltage/high current systems such as PCS and battery systems.
	CAUTION! Li-Ion battery ESS (energy storage system) inside. When assembling the system, do not intentionally short the positive (+) and negative (-) terminals with metallic object. All works on the ESS and electrical connections must be carried out by qualified personnel only. The ESS inside 3.6kWh All in One provides a safe source of electrical energy when operated as intended and as designed.

	Potentially hazardous circumstances such as excessive heat or electrolyte mist may occur under improper operating conditions, damage, misuse and/or abuse. The following safety precautions and warning messages described in this section must be observed. If any of the following precautions are not fully understood, or if you have any questions, contact Customer Support for guidance (see chapter 13). The safety section may not include all regulations for your locale; personnel working with 3.6kWh All in One must review applicable federal, state and local regulations as well as the industry standards regarding this product.
	CAUTION! This product is intended to be used for PV source inputs and residential home grids (AC 230V). If not used as intended, the protection provided by the equipment may be impaired.
	CAUTION! This device is designed appropriate for two-PV string structure. Therefore, the PV string 1 and PV string 2 must be connected to PV input 1 and PV input 2, respectively. Do not split one PV string output for connecting it into the PV input terminal 1 and input terminal 2.

2.3 Product Overview

This device is an All in One System including the PV inverter, battery charger / discharger, Lithium Ion battery, and EMS, and compared to existing products, installation is simple, and is an optimized solution to increase self-consumption rate at low cost.
The basic operation modes consist of PV generation mode, PV generation + charge/discharge mode, and battery discharge mode, and the type of operation mode is determined by the EMS command.



Part Listings

No.	Description
1	Lithium Ion battery
2	PCS (PV inverter, battery charger / discharger)
3	Tray BMS
4	Input / Output terminal (MC4-2set, Grid connection terminal -L/N/PE)
5	Cooling Fan
6	Communication
7	Carrying handle

2.3.1 Battery & PV Inverter Specifications

Battery data	**Value**	**Unit**
Battery Capacity	3.6	kWh
Battery voltage range/nominal voltage	43.2 ~ 67.2 /60	Vdc
Battery Max. current	47	A
Battery DC/DC data	**Value**	**Unit**
Nominal Power	2.0	kW
Technology	Isolated	-
PV inverter connection data	**Value**	**Unit**
Max. input total power	6.6	kWp
Max. input power per string	3.3	kWp
Max. input voltage	550	Vdc
Min. input voltage/Initial input voltage	125/150	Vdc
MPPT voltage	125~500	Vdc
Max. input current per string	15	A
Number of MPP trackers	2	EA
Max. number strings	2	EA

2.3.2 AC specifications

Grid connection data	**Value**	**Unit**
Nominal output power	4.6	kW
Max. nominal output power	5	kVA
Max. output current	25	A
Max. allowed fuse protection	32	A
Harmonic distortion of output current (at THD<2%, P_{AC}> 0.5 P_{ACnom})	5	%
Nominal AC voltage/range	230/184~264	V
AC grid frequency	50	Hz
Over voltage category	III	-
AC connection	1	phase
Operating temperature	-10~40	° C
Storage temperature	-20~60	° C

2.3.3 Grounding the PV Inverter

The PV inverter complies with the local requirements for grounding the PV inverter. Samsung SDI recommends connecting and grounding the PV inverter's frame and other electricity conducting surfaces in such a way that there is continuous conduction in order to achieve maximum protection for systems and persons. And the PV inverter's DC(+) pole and DC(-) pole are not permitted to be grounded.

Also, PV module shall be an IEC 61730 Class A rating type.

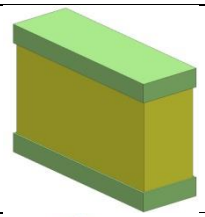
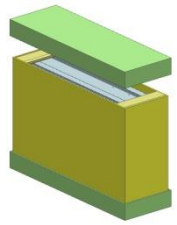
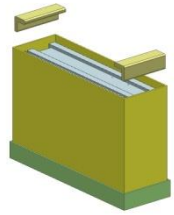
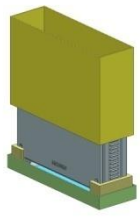
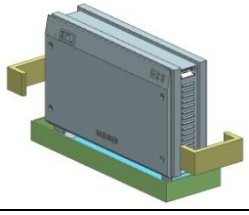
3 Package Removal and Inspection

	CAUTION! In this box, battery and printed circuit board are included, therefore care must be taken in handling. Also, the weight is 95kg, therefore more than two persons must deliver and remove the package.

3.1 Package Removal and Tray Assembly

3.1.1 Enclosure Package Removal

The enclosure package removal is carried out in the following order as shown in the Figure below.

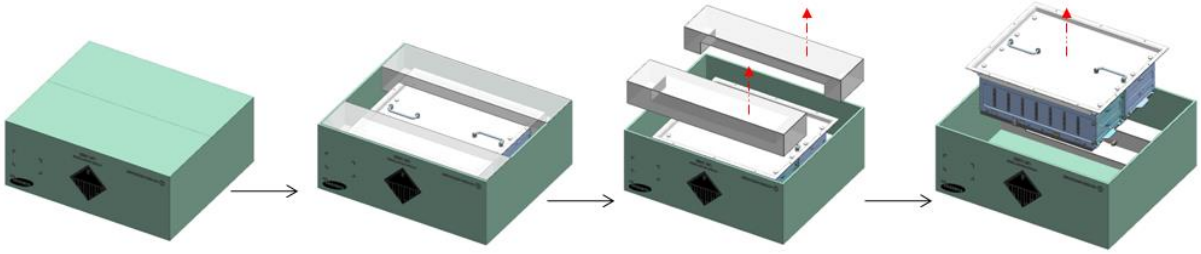
1. Place the system on the installation location.	
2. Open the upper cap of the battery.	
3. Remove both sides of the cover in the front of the product.	
4. Lift the package.	
5. Open the side support on the bottom.	

3.1.2 Battery Tray Package Removal

The Figure below shows the package removal order of the battery tray.

(1) Prepare the product.
(2) Open the box cover
(3) Remove the buffer.
(4) Take out the battery tray. Grab the handle and pull up.

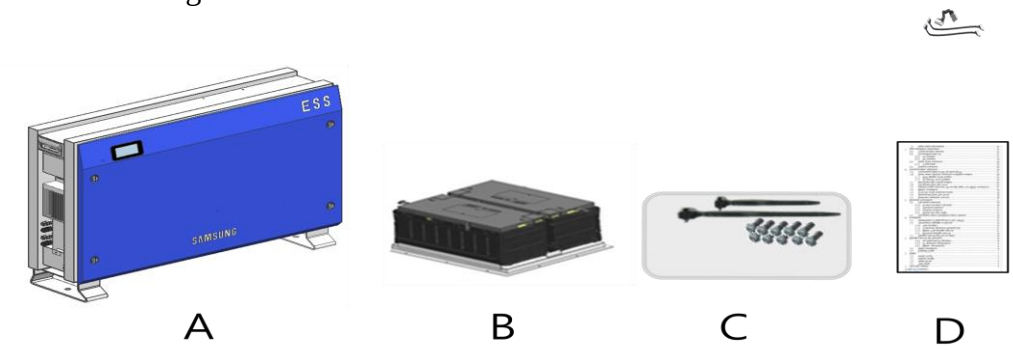
(Please lift with more than two persons. The tray weight is 42.65kg)



3.1.3 Component check (Packing List)

The Figure and the Table below is an illustration of and a list of components included in the package on product delivery. Check that the quantity of each component is correct.

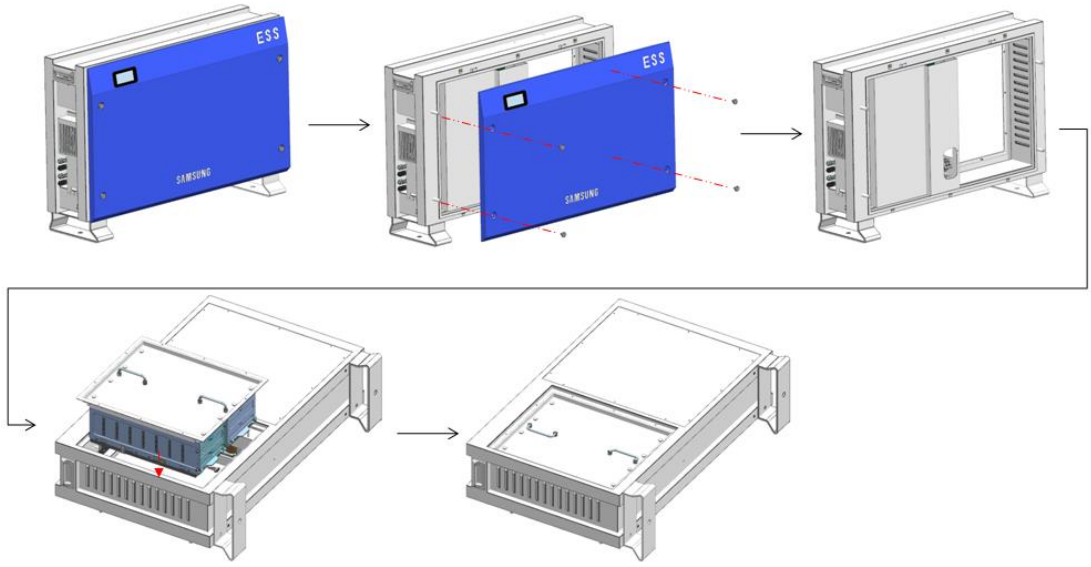
- Packing List



Object	Part Name	Code No.	Quantity
A	INVERTER ASSY	SJ94-00108A	1
B	TRAY ASSY	ELPT362-00031	1
C	1. SCREW(M4xL16) 2. EXTENTION WIRE 3. EXTENTION WIRE 4. EXTENTION WIRE 5. CABLE TIE(A,B)	SJ81-01146 3901-000819 3901-000820 3901-000821 -	10 1 1 1 2
D	Quick Guide Manual	-	1

3.1.4 Tray Assembly

The Figure below is a simple illustration for assembling the battery tray. For the tray assembly, refer to Clause 5.4 to assemble by referring to the description of electrical connection.



3.2 Checking for Damages in Delivery

When opening the box with Samsung 3.6kWh All in One system inside, check for any damage and that the number of components is correct. For example, if there is a scratch on the enclosure, contact the dealer.

3.3 Identification of Samsung 3.6kWh All in One

On the enclosure of this device, Type Label is attached. In the Type Label, the identity of this product is described. The contents below are indicated on the Type Label. For safe usage, the user must be well-informed of the contents in the Type Label. The Type Label includes:

Product Name
Device Type (Model)
Serial Number (Serial No.)
Device-specific characteristics
Certification Lists
Warnings and Notification

The model No. of 3.6kWh All in One system is defined as below.

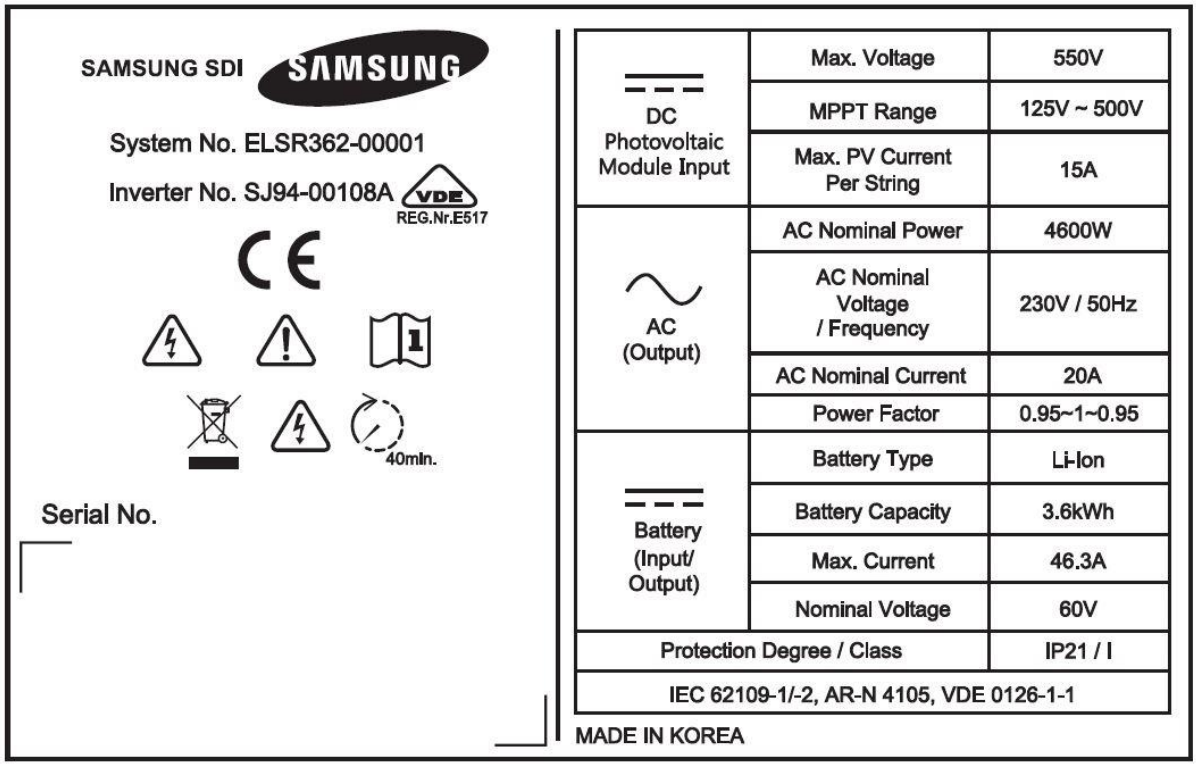
ESLR362-00001

ESLR: Residential application
36: Battery capacity (x0.1kWh)
2: Battery capacity group (Less than 10kW)
00001: product line number

The model No. of PCS (power conditioning system) is defined as below.

SJ94-00108A
SJ: battery for ESS
94: Ass'y
00108: product number
A: version type

The Table below is the Type Label.



DC Photovoltaic Module Input	Max. Voltage	550V
	MPPT Range	125V ~ 500V
	Max. PV Current Per String	15A
AC (Output)	AC Nominal Power	4600W
	AC Nominal Voltage / Frequency	230V / 50Hz
	AC Nominal Current	20A
	Power Factor	0.95~1~0.95
Battery (Input/ Output)	Battery Type	Li-Ion
	Battery Capacity	3.6kWh
	Max. Current	46.3A
	Nominal Voltage	60V
Protection Degree / Class		IP21 / I
IEC 62109-1/-2, AR-N 4105, VDE 0126-1-1		

MADE IN KOREA

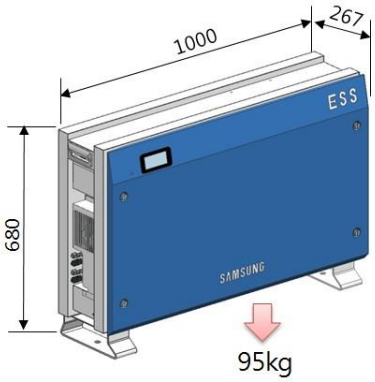
4 Installation

4.1 Mounting Location (Installation location) Selection

Symbols	Meaning
	CAUTION! Danger to life due to fire or explosion! Danger to life due to high voltages!
	Despite careful construction, a fire can occur with electrical devices Do not install the 3.6kWh All in One: On flammable construction materials In areas where highly flammable materials are stored In potentially explosive areas!
	CAUTION! Li-Ion battery energy storage is inside 3.6kWh All in One. ESS inside 3.6kWh All in One provides a safe source of electrical energy when operated as intended and as designed. Potentially hazardous circumstances such as excessive heat or electrolyte mist may occur under improper operating conditions, damage, misuse and/or abuse. The following safety precautions and the warning messages described in this section must be observed. If any of the following precautions are not fully understood, or if you have any questions, contact Customer Support for guidance. The Safety Section may not include all regulations for your locale; Personnel working with 3.6kWh All in One must review applicable federal, state and local regulations as well as the industry standards regarding this product.
	All works on the ESS and electrical connections must be carried out by qualified personnel only.

4.1.1 Dimensions and Weight

The dimension of the 3.6kWh All in One after assembly is 1000 x 680 x 267mm. The weight is 95kg. The Figure below shows the outer dimensions and the weight after assembly.



	Battery	Inverter (Include case)	Total
Weight	42.8kg	52.2kg	95kg

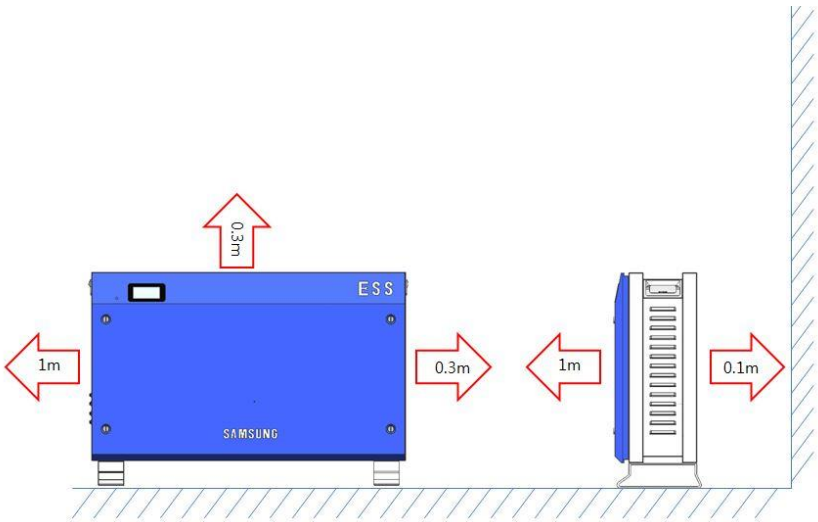
4.1.2 Ambient Conditions

The proper installation location for the device is where installation and removal is possible anytime. This device must be in a location always possible to reach.

The ambient temperature of the location in which this device will be installed is -10℃ ~ +40℃.

4.1.3 Minimum Clearance

For the safe installation of the product, a minimum clearance is required. Refer to the Figure below to secure the space. For the minimum clearance, keep a distance of 0.1m from the wall, 1m in the front of the device, 1m and 0.3m on each side, and 0.3m on top.

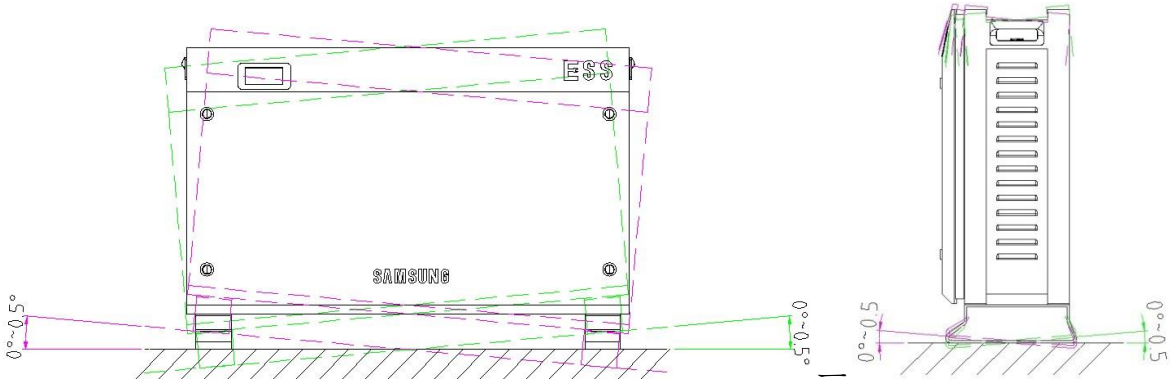


4.1.4 Position (Location Selection)

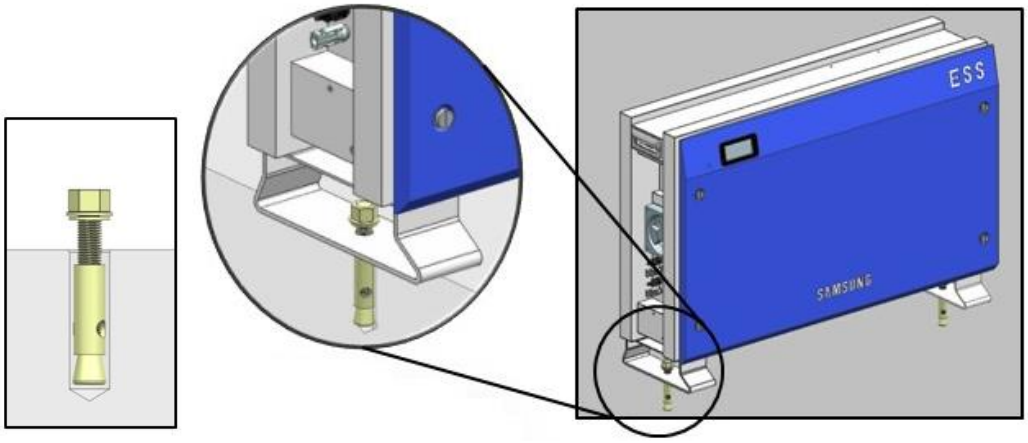
Install on a flat surface. (Front, back, left, right gradient within ±0.5°)

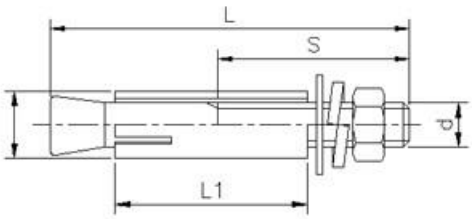
Considering the ventilation, the side of the system should be away from the wall about 0.3m at least. Also, take caution not to have objects stuck in the blowing fan, ventilation entrance and exit.

Refer to the Figure below.



4.2 Mounting Instructions





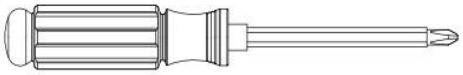
Screw name	L	S	D	L1	Drill used	Drill depth (Min.)	Max. tensile capacity	Max. shear capacity
1/2(M12)	100	60	17	50	17	55(mm)	320(N·m)	340(N·m)

[Anchor bolt specification]

1. Select the drill proper for specifications for drilling.
2. Remove the dust from the hole, and separate the nut and the washer to insert only the bolt and the cap.
3. Place the product and assemble the washer and the nut to the bolt, and use the spanner to fasten the nut (7N·m).

※ Required tools for installation

Flat head driver for front cover knob, larger than 10mm



Phillips head driver(No.2) for tray, side cover, grounding

For fastening anchor nuts

Fork lifter with hight: 85-200mm

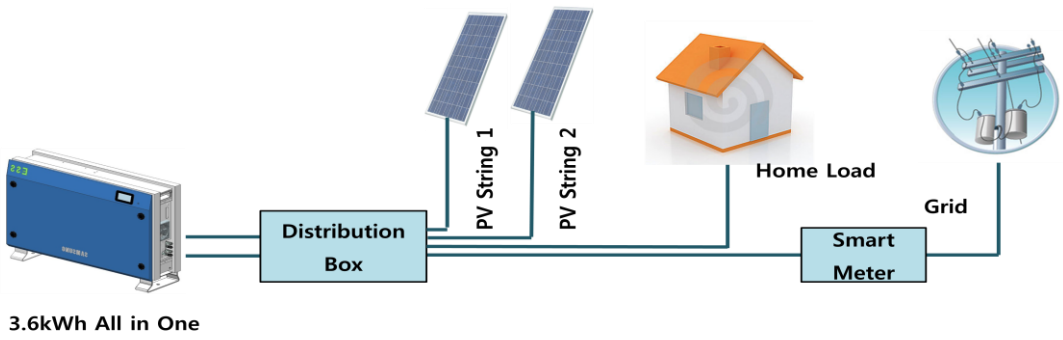
5 Electrical Connections

Notice! Static discharge can damage the 3.6kWh All in One! Before you touch a component inside the 3.6kWh All in One ground yourself by touching PE or a grounded object

Symbols	Meaning
	CAUTION! When working with the Li-Ion Battery Tray for the 3.6kWh All in One, the following personal protective equipment must be worn: High voltage rated rubber gloves Safety goggles or other eye protection Standby for 40 minutes for complete discharge within the system before testing electrical parts inside the system!
	Follow the guidelines below when handling the Li-Ion Battery Tray. Do not intentionally short circuit the positive (+) and negative (-) terminals with metallic object. Do not remove insulation cap on the terminals. If insulation cap is removed, avoid contact between the metals and the battery terminals. Do not damage the screw thread. Do not use seriously scarred or deformed battery. Dispose immediately according to proper regulations. Do not damage sheath of cable and connectors.

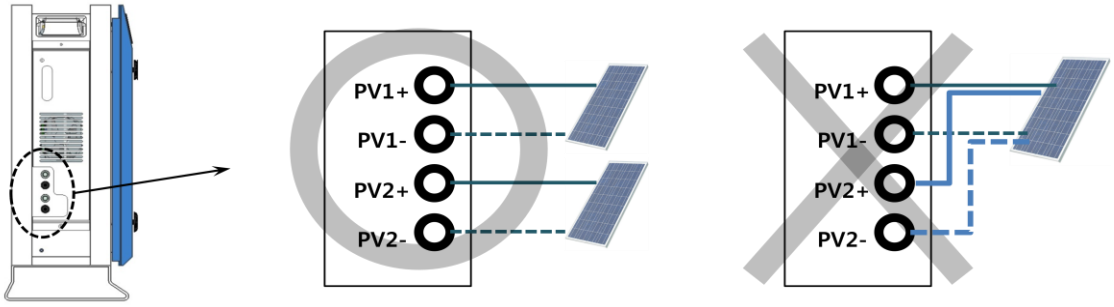
5.1 Electrical Connection Overview

The 3.6kWh All in One has two solar energy inputs (PV1, PV2). For each PV input, 3.3kW (per string) is the maximum output. The AC output of All in One is connected to the Home Load and the Grid. Between the Home Load and the Grid, a Digital Energy Meter(Smart Meter) is placed for power metering. Between the All in One, the AC circuit breaker and DC Disconnect switch in the distribution box are installed for safety.



Electrical connections

Two independent channels of the PV Input exist in the 3.6kWh All in One as shown in the figure below, ({PV1+, PV1-}, {PV2+, PV2-}). They are used independently for running the maximum power from the sources, PV1 and PV2. For the two PV Inputs, independent use of two channels is recommended. The parallel connection of one PV string into two independent PV inputs (PV1, PV2) should be avoided (Refer to 3.6kWh All in One Solar energy input connection in the Figure below). PV common mode is not allowed.
One PV sting should not be commonly connected to the All in One's two input terminals. In other words, the split wiring from one PV string output should not connect into two independent PV inputs (PV1+, PV1- and PV2+, PV2-). (Refer to the PV String connection method in the Figure below).



The input / output power cable corresponding to the AC, DC input / output specifications in this system is shown in the Table below.

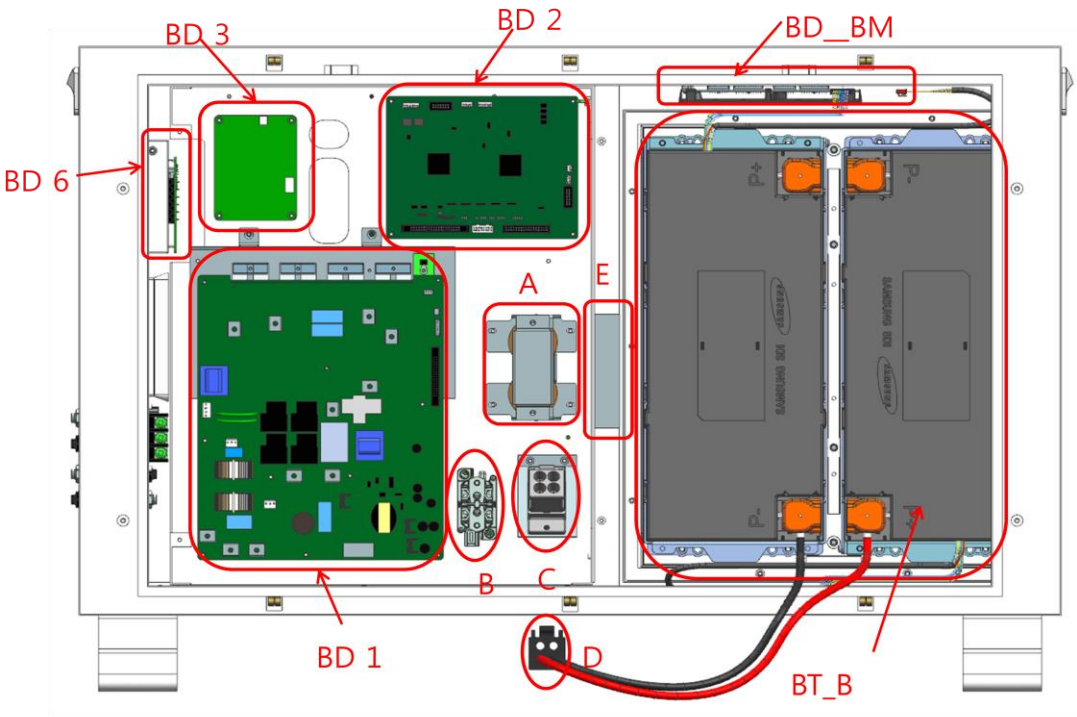
Recommended cables for 3.6 kWh All in One

	Area	Insulation	Color code
Grid (L,N)	6mm^2	600V or more	Black
PE	6mm^2	600V or more	Green with Yellow lines
PV (+), (-)	6mm^2	700V or more	Black

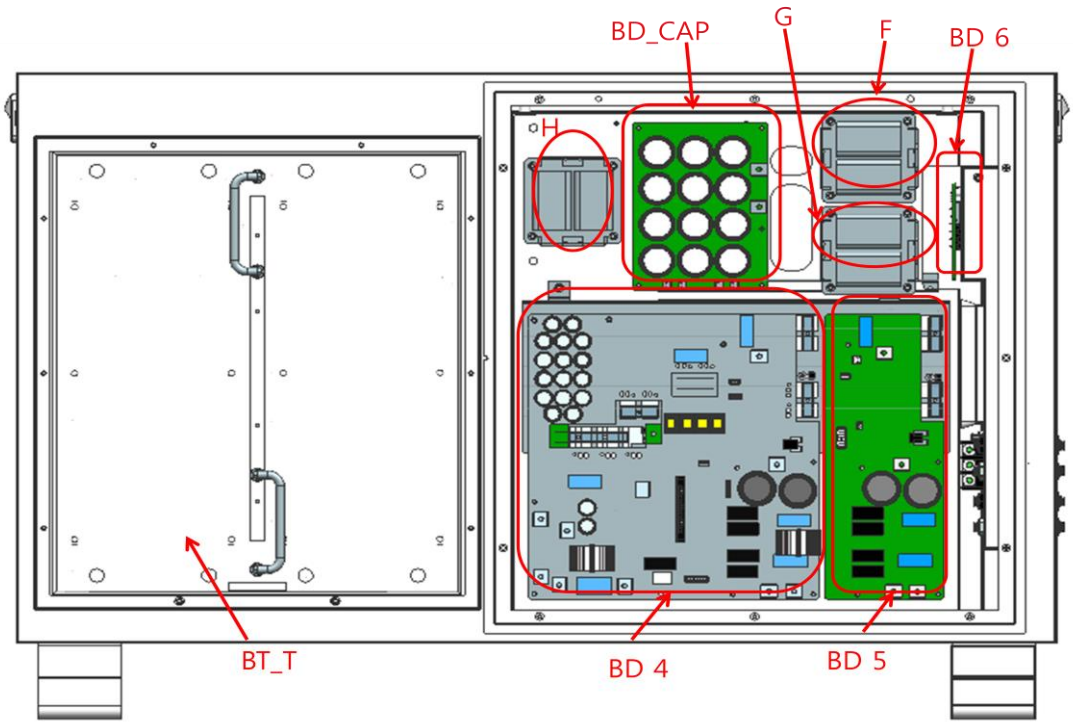
The Figure below is the overall drawing of the system. Please refer to the Figure of the drawing on installation and maintenance.

Object	**Part List**	
A	AC reactor	PCS
B	DC relay	PCS
C	BDC side connector (BATT-A)	PCS
D	Battery side connector (BATT-B)	BATTERY
E	FAN2	PCS
F	PV1 reactor	PCS
G	PV2 reactor	PCS
H	BDC reactor	PCS
I	FAN1	PCS
BD 1	Board1 (PN. SJ92-01425A)	PCS
BD 2	Board2 (PN. SJ92-01429A)	PCS
BD 3	Board3 (PN. SJ92-01434A)	PCS
BD 4	Board4 (PN. SJ92-01426A)	PCS
BD 5	Board5 (PN. SJ92-01427A)	PCS

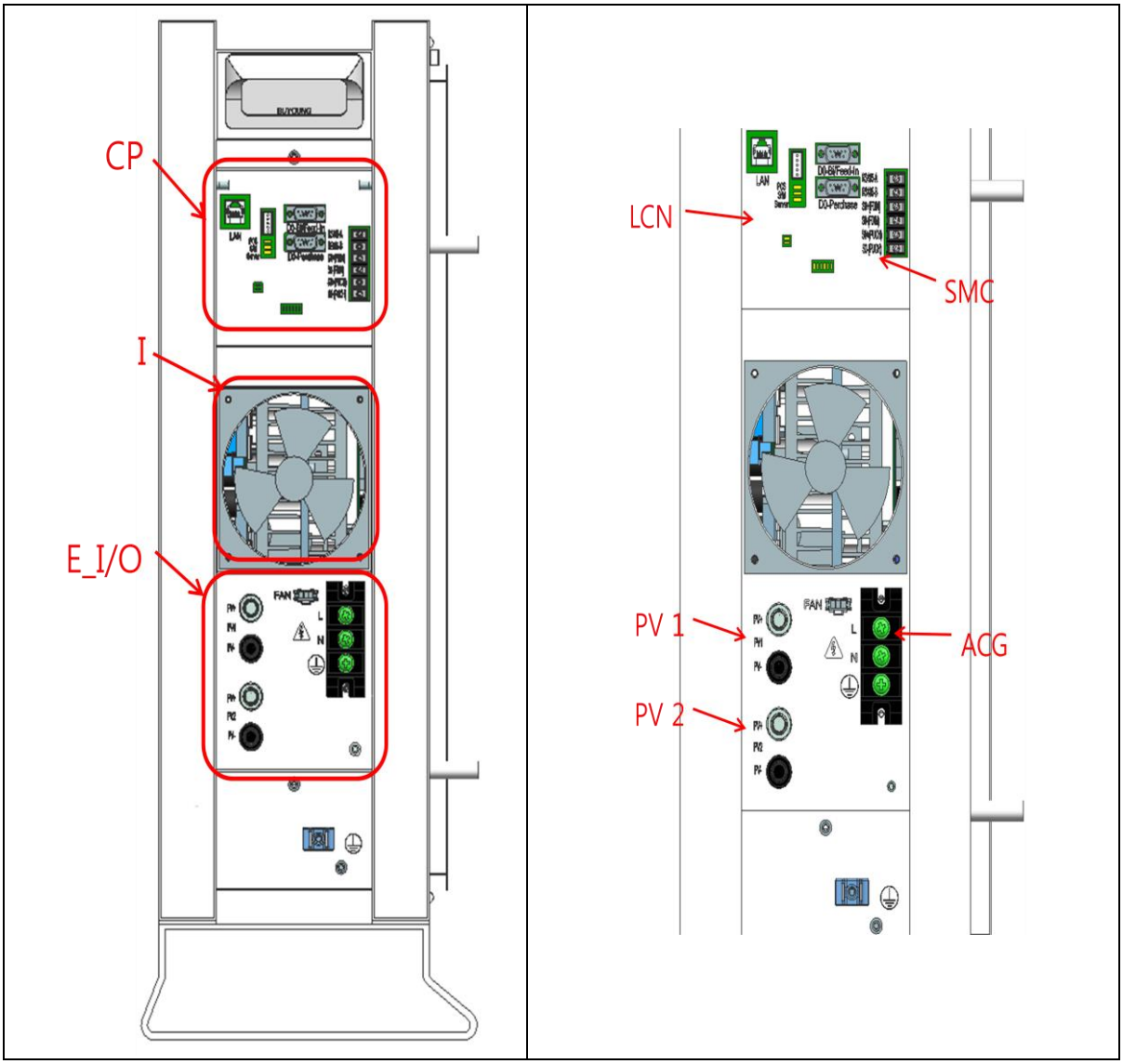
BD 6	Board6 (PN. SJ92-01424A)	PCS
BD_BM	Board battery management	BATTERY
BD_CAP	Board_CAP	PCS
BT_B	Battery Tray bottom view	BATTERY
BT_T	Battery Tray top view	BATTERY
CP	Communication part	PCS
E_I/O	Electrical I/O part	PCS



Front Inside View



Rear Inside View

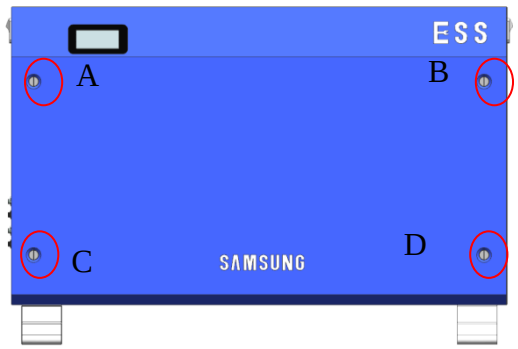


Side View

Object	Part List
LCN	LAN Connector
SMC	Smart Meter Connector
PV 1	PV input 1
PV 2	PV input 2
ACG	AC Grid inputs

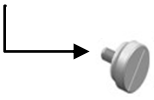
5.2 Opening the Front Case Cover

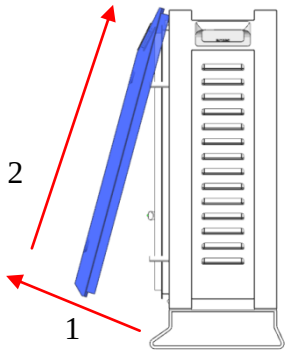
For electrical connection, the front case cover must be first removed. 3.6kWh All in One is delivered with the blue front case cover attached as shown in the Figure below.



Front View

Turn the screws (A, B, C, D) to disassemble.



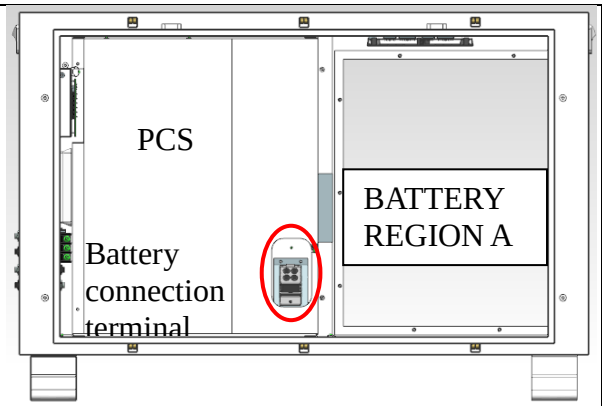


Side View

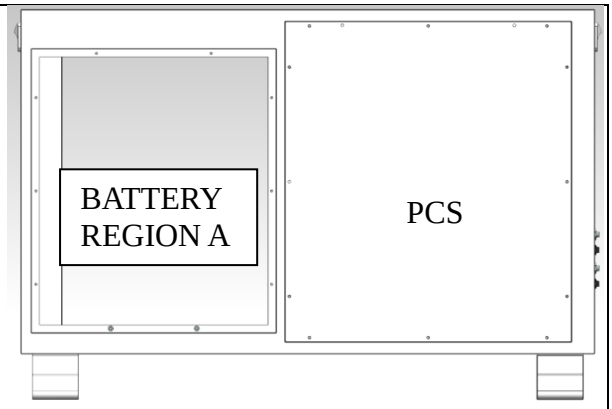
1. Pull the lower end to 15 degrees gradient.
2. Push upward to separate the front case cover from the upper ring.

5.3 Overview of the Connection Area

The Figure below each shows the inner structure of the 3.6kWh All in One when the front case cover is removed. When the front cover enclosure is removed (section 5.1), the inside of the 3.6kWh All in One is shown as in the Figure below (front view).



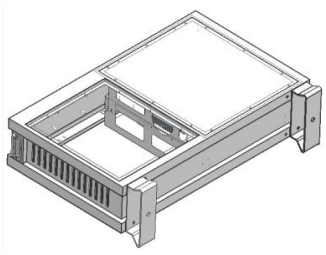
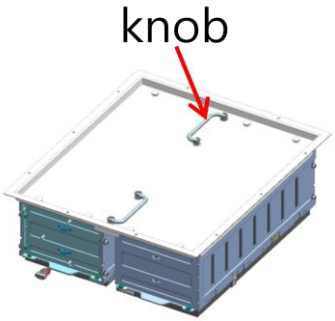
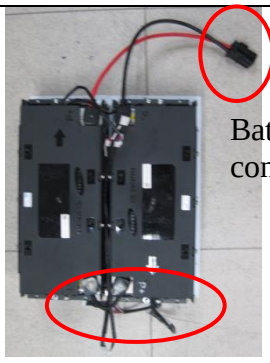
Inside Front View

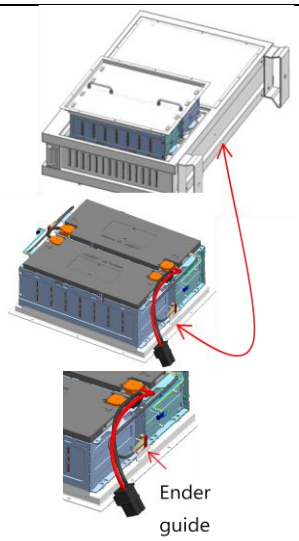


Inside Rear View

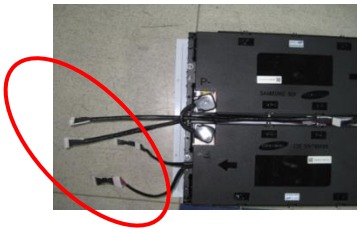
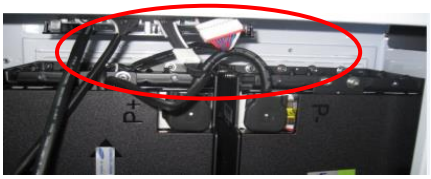
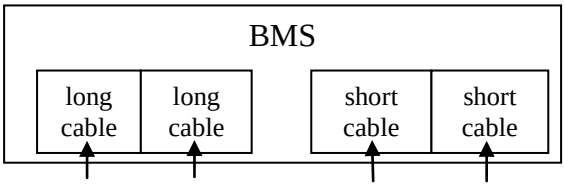
In the front part of the inside, the PCS circuit is blocked by the safety shield, only the part for the battery to be inserted (Region A) is left. On the upper Battery region, BMS circuit board is seen, and the battery connector housing must be checked (4EA). Also, there is battery power connection terminal (red red circled) in below the device.	On the back part, PCS shield is shown, and other connection terminals are not shown.

5.4 Battery Installation

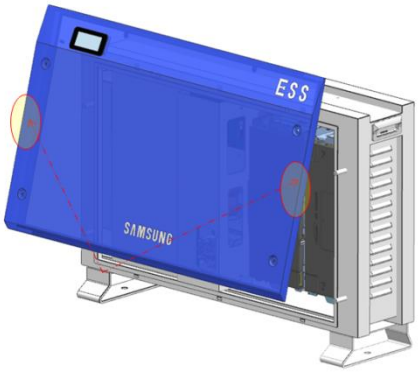
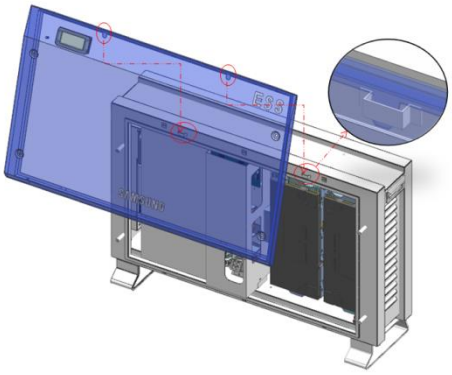
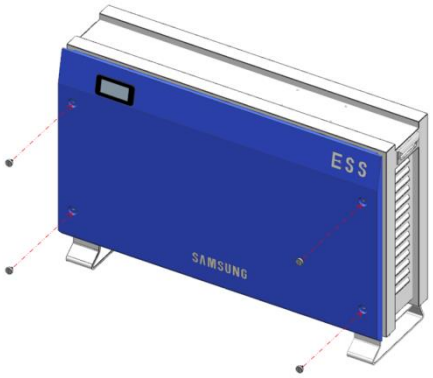
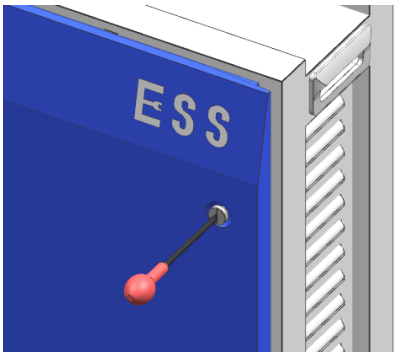
1. As shown in subsection 5.2, remove the front case cover, and lay down the system main body. The system must be laid for the inside rear view to face upward. When laying the system, at least two persons must work together for the worker's safety. The Figure on the right is the view when laid down.	
2. To dock the battery on the main body, prepare the battery tray. Because the battery is heavy, at least two persons must work together. In the battery tray, a knob is located on the plate. The Figure on the right is a view of the battery tray seen from the enclosure. The battery is located on the opposite side of the knob enclosure.	
3. The Figure on the right is a view of the battery tray seen from the battery. In the battery, the output cable is connected with the connector. Also, four BMS and the signal cables come out from the battery module.	

4. With the main body laid down, hold the tray to lift up. More than two persons must do this together. As shown in the Figure on the right, the battery module must be docked. Dock battery tray so that ender guide faces the leg of exterior case of main body (battery terminal unit needs to face the leg of main body. On module docking, the battery cable should not be caught on the Battery frame. After docking, fasten the screw fixing the tray and the main body. Use two persons to lift it up. Join by tightening screw of battery tray with 14~16N·m of torque	 Docking on the laid position

5.5 Inner Wiring Connection (Power and Signal Wire Connection for BMS)

1. The lead of the battery tray is shown in the Figure on the right. Two short lines and two long leads come out from the battery as shown in the Figure on the right.	
2. As described in subsection 5.4, fix the battery on the 3.6kWh All in One, and check the signal line of the battery part on the opposite side. When fixing the battery tray, take care not to bind the lines or to catch them on the corner. Plug four cable lines on the Tray BMS to the upper BMS socket. Plug in the order of two long lines on the left side of the BMS, and the short two lines on the right side of the BMS.	 
3. Lastly, connect the power cable line coming out from the battery to the battery power terminal in the middle. Connect BATT-A and BATT-B. BATT-A: Connector on the BDC side, BATT-B: Connector on the battery side	

5.6 Closing the Front Case Cover

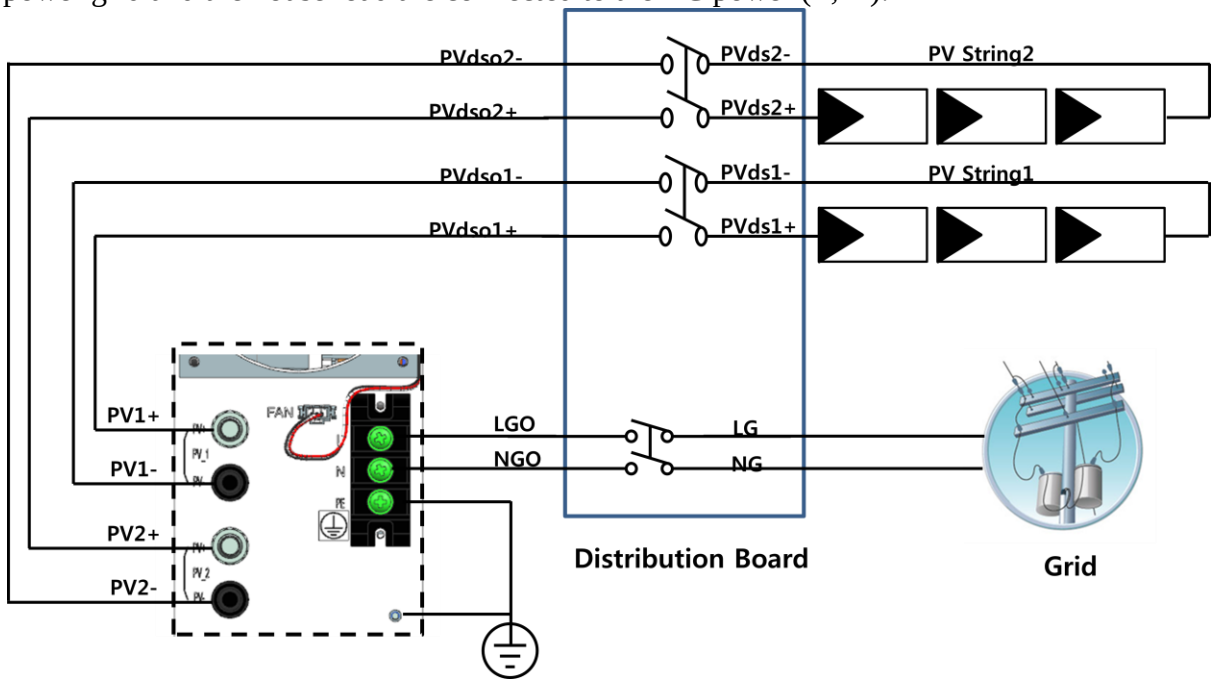
1. Hold the front case cover with both hands.	
2. Hang the product cover on the upper surface of the enclosure and push the product cover forward to close.	
3. As shown in the Figure on the right, use a tool to fix the bolts into the four spots indicated in red circles.	
4. Fix all four sites with the tool (flat driver) as shown in the Figure. (Screwing Torque=1.4N·m)	

5.7 Distribution Box(board) Locking Method

The distribution board connected to the PCS, PV and Grid must have the functions mentioned below.

- AC Grid block function (ex) AC circuit breaker
  : 230Vac, 32A, 10kA (short circuit current rating)
- DC block function; DC disconnect switch must be fitted.
  PV String1 block function (ex) DC disconnect switch
  PV String2 block function (ex) DC disconnect switch
  : 650Vdc or more / 15A or more
- RCD(residual current device): Leakage current measure and block

The Figure below shows the connection diagram of the distribution board. The distribution box receives the DC input (PV string 1, PV string 2) from the solar energy module. Also, the power grid and the house load are connected to the AC power (L, N).



Distribution box connection diagram

	CAUTION The PV string 1 and the PV string 2 must be each connected to the distribution box terminal as shown in the distribution board connection diagram. Do not change the PV string 1 and PV string 2 to parallel to be connected.

5.7.1 AC Circuit Breaker and DC Disconnect Switch

However, the circuit breaker populated on the distribution board is selected by the installer, and the installation standard is that a circuit breaker satisfying the voltage and the current specification of the Grid, PV must be installed. The cables presented in the Table below are recommended.

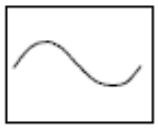
	Standard	Short circuit current rating
AC circuit breaker	230Vac / 32A	10kA minimum
DC disconnect switch	650Vdc / 15A or more	-

	Area	Insulation	Color code
Grid (L,N)	$6mm^2$	600V or more	Black
PE	$6mm^2$	600V or more	Green with Yellow lines
PV (+), (-)	$6mm^2$	700V or more	Black

As illustrated in the Figure, Distribution box connection diagram, the connections from the All in One system to the distribution box are connected to the terminals of the solar energy (PVdso1+,PVdso1-,PVdso2+,PVdso2-) of PV1+, PV1-, PV2+, PV2-. Here, the main body terminals (PV1 +, PV1 -, PV2+, PV2-) and the distribution box terminals are connected in proper order. Meanwhile for the lines coming from the AC GRID, L, N leads are connected to the distribution board (LG, NG). The line comes out from the LGO, PGO of the distribution board to be connected to the L, N terminals of the All in One System.

5.7.2 RCD (residual current device) Leakage Circuit Breaker

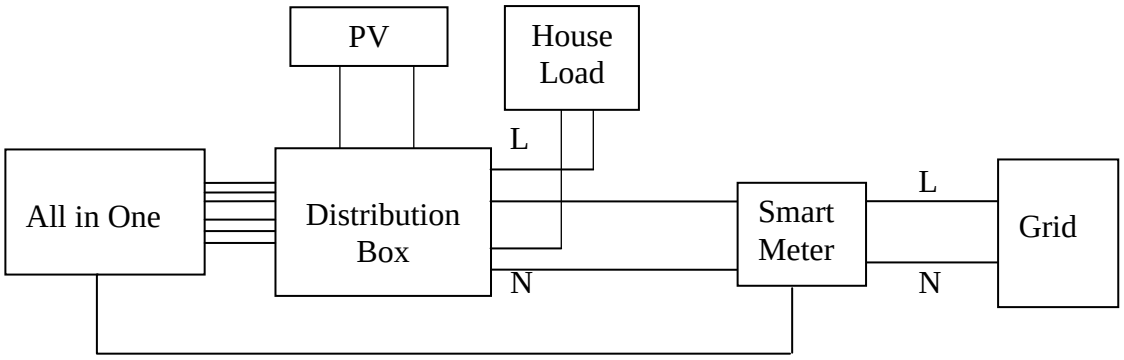
This product can cause a DC current in the external protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of Type A or Type AC is allowed on the supply side of this product.

	Type AC	AC current sensitive
	Type A	AC current sensitive and pulse current sensitive

5.8 Smart Meter Electrical Connection Installation Method

The electrical installation method of the digital energy meter(smart meter) must comply with installation method provided by the digital energy meter(smart meter) manufacturer. However, selection of the digital energy meter(smart meter) must be done recommended by Samsung SDI in Chapter 6.3 on the following page.

The Figure below shows the electrical cable connection and the communication lines of the digital energy meter(smart meter). Depending on the product, there are a one-way meter and a two-way (bidirectional) meter, and for the one-way meter, two lines must be connected in series for use. For the two-way meter, one line can be used. Refer to the Figure below and the communication description in Chapter 6 to install the digital energy meter(smart meter).



Electric cable connection for Smart meter installation

Depending on the smart meter, the end system of the used lead wiring may be different, therefore, refer to the smart meter manual.

5.9 Connecting Method of DC line from the PV

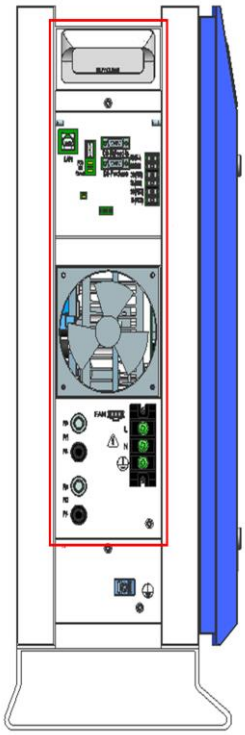
For the PV module connection, refer to the Figure below. The lead wire coming from the PV module is connected to the distribution box. For the structure of the distribution box, refer to subsection 5.7. For the connection to the distribution box, connect each to the terminals of the solar energy of PV1+, PV1-, PV2+, PV2-. On the other hand, connect the 3.6kWh All in One main body terminals (PV1 +, PV1 -, PV2+, PV2-) and the distribution box terminals in proper order. The lead wire thickness is to be as shown in the following Table.
For the connecter (PV1+, PV1-, PV2+, PV2-) connecting from the distribution box to the 3.6kWh All in One input, the type in the Figure below is used (MC4 connector, PV-Stick Photovoltaic connector “PUSH IN” connection).

PV connector (Left) Male: PV line (Right) Female: All in One system

The Table below shows the lead wire standard of the PV. For the 3.6kWh All in One, 6mm^2 thickness of lead wire is recommended.

	Area	Insulation	Color code
PE	6mm^2	600V or more	Green with Yellow lines
PV (+), (-)	6mm^2	700V or more	Black

After opening the side cover, perform the PV, AC connection. (Refer to the contents below). For the side cover, disassemble the screw to open.



Side cover opening

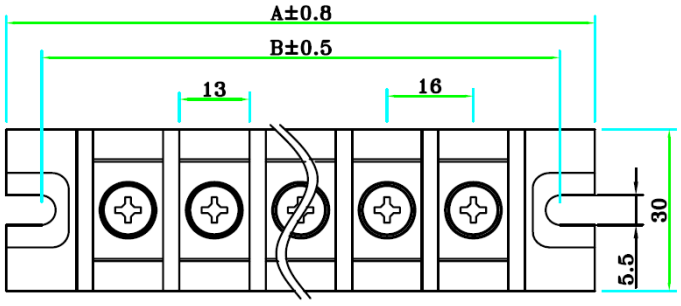
The Male product is connected to the lead wire coming from the distribution box in the PV side, and the Female part is attached to the All in One system, and docking is done when connected together. After opening the side cover, perform the PV, AC connection.

PV connector connection (MC4 connector connection)

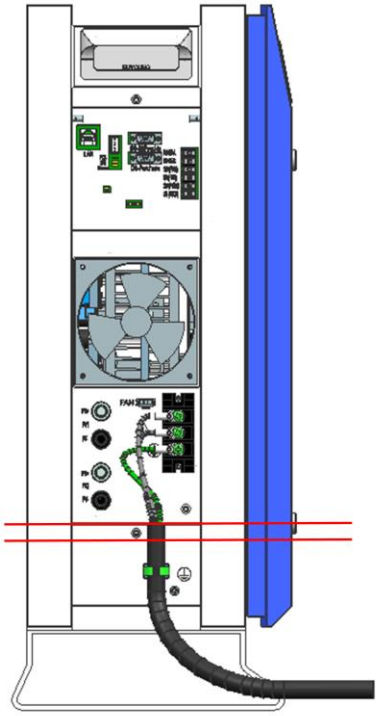
In the All in One System, the I/O of the AC power is composed of Terminal socket type. When connecting the cable to the L and N sockets in the Terminal block, the ring terminal is attached to the end of the cable to be connected to the main body terminal. The Figure below shows the connection method of the AC part. Use the ring terminal (M5) for locking. We recommend the cable composed of two power cord and one PE cord and have insulation cover which contains all three cords like in the figure. Each cord shall be 6 mm^2 and the diameter of cable shall be approximately 18mm^2. You should make the PE cord is longer than other live cords of the cable so that the pulling force will not be applied to the PE cord. The PE terminal is connected to the PE of the sash to be ground connected.

L, N AC line connection method

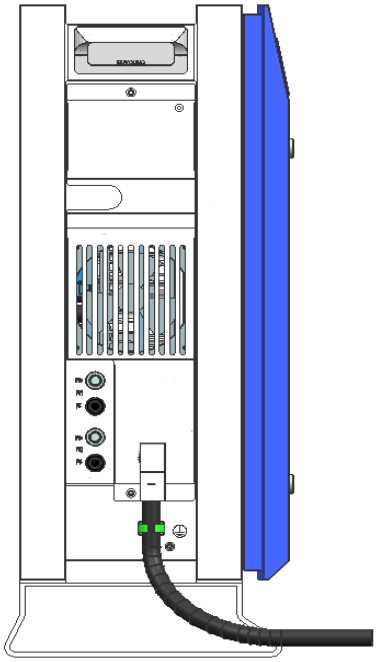
The schematic below shows structure of the terminal block.



After that, tie the cable to the mount using the cable tie B (larger one which is included as an accessory) to the tie mount. You should tight the tie such that there will not be any slip when you pull the cable with the force of 100N. And the end of outer cable surface should be within 10 mm below the end of protrusion.(See the figure. The red line shows the boundary.)



Close the side cover with screw. In the case of closing the side cover, the torque value of the screw is 1.2~1.8 N·m.



6 Communication Connection

6.1 Internet Connection

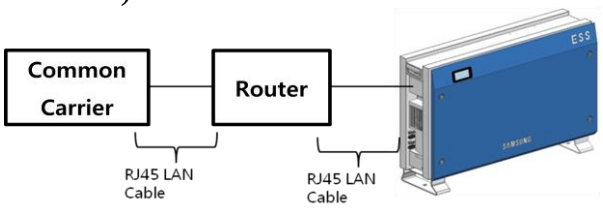
6.1.1 Components

6.1.1.1 Wired router (Not provided in the product)

6.1.1.2 RJ45 general LAN Cable (Not provided in the product)

6.1.2 Connection Block Diagram

LAN (Common carrier→ Router)→ ESS



6.1.3 Connection Method

In the communication terminal part shown in subsection 6.4, plug the RJ45 LAN Cable between the LAN terminal and the router.

6.2 Smart Meter Connection

6.2.1 D0 Interface

6.2.1.1 Components

6.2.1.1.1D0 to RS 232 cable (Not provided in the product)

6.2.1.1.1.1 Cable name

KMK111RS232 OPTICAL Probe

6.2.1.1.1.2 Manufacturer

Z Telemetri

www.probeformeters.com

6.2.1.1.2 Meter for D0 (Not provided in the product)

Refer to meter list in subsection 6.3

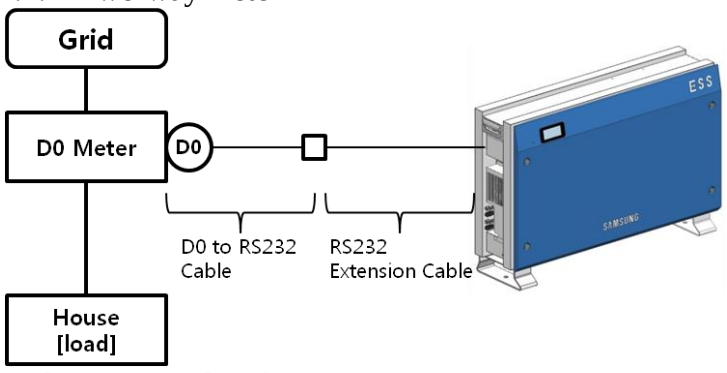
6.2.1.1.3 RS232 D-sub 9 pin straight type extension line

6.2.1.1.4 Cable length limit

The total length of D0 to RS232 Cable and the extension line is 10m or less

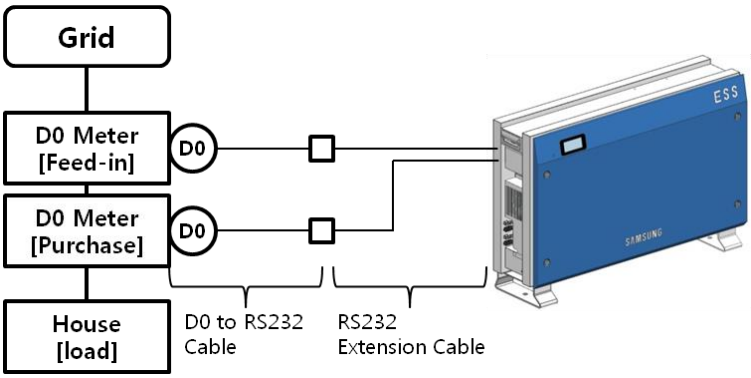
6.2.1.2 Connection block diagram

6.2.1.2.1 Two-way meter



The meter cable must be connected to the D0-A.
(Refer to communication terminal in 6.4.1)

6.2.1.2.2 On using One-way meter



Feed-in Meter Cable must be connected to the D0-A.
Purchase Meter Cable must be connected to the D0-B.
(Refer to communication terminal in 6.4.1)

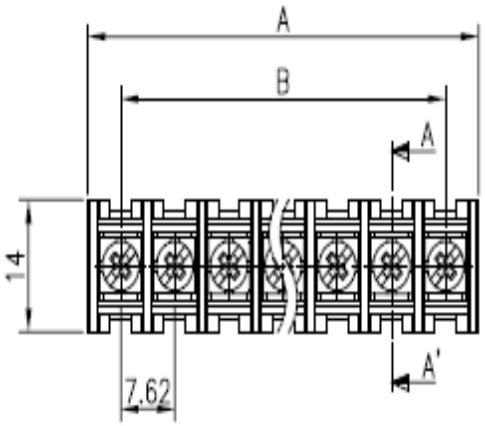
6.2.2 S0 Interface

6.2.2.1 Components

6.2.2.1.1 S0 Meter

6.2.2.1.2 Connection line (Not provided in the product)

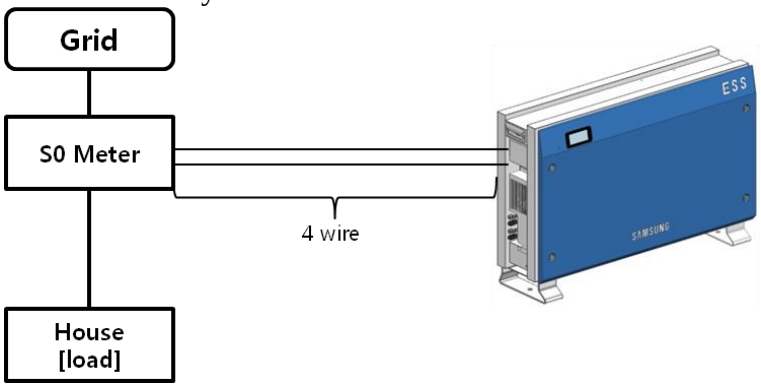
6.2.2.2 Connection terminal



A : 47.42 mm +/- 0.8 , B : 38.1mm +/- 0.5

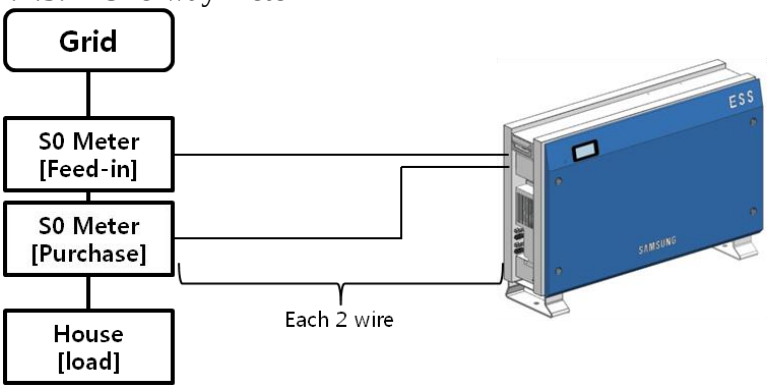
6.2.2.3 Connection block diagram

6.2.2.3.1 Two-way meter



Feed-in 2 wire must be connected to the S0(A).
Purchase 2 wire must be connected to the S0(B).

6.2.2.3.2 One-way meter



Feed-in Meter Cable must be connected to the S0(A).
Purchase Meter Cable must be connected to the S0(B).

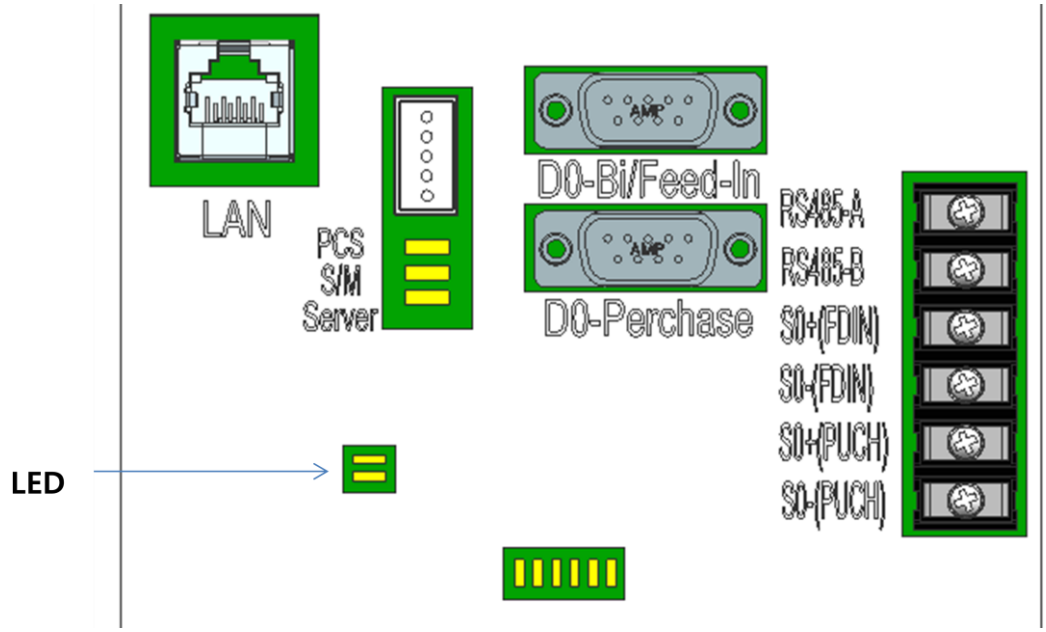
6.3 Recommended Meter List

No.	Company	Model	Interface	Direction
1	EasyMeter	Q3DA1004	D0	Unidirection
2		Q3DA1024	D0	Bidirection
3		Q3DA1034	D0	Unidirection
4	Hager Vertriebsgesellschaft	EHZ363ZA	D0	Bidirection
5	EMH Metering	eHZ-IW8E2A5L0EQ2P	D0	Bidirection
6	EMH Metering	ED300L W2E8-0N-EL0-D2-0000002-F50/Q2	D0	Bidirection
7	EMH Metering	eHZ-IW8E2A5WL0EQ2P	D0	Bidirection
8	ISKRAEMECO GmbH	MT174-D2A52-V12G12-KO	D0	Bidirection
9	EMU Elektronik	Professional 3/75	S0	Bidirection

※ The meters above are products supplied to Stark Company (Germany)

※ We recommend D0 bi-directional meters.

6.4 Communication Terminal



Communication terminal

6.5 Homepage

The customer purchasing this device can use the web browser (https://myess.samsungsdi.com) or the smart phone to check operation status and various operation statistical information in the house or remotely.

6.5.1 Service Terms

This service is provided only when the device is connected to the Internet, and specific services can collect additional information only after approval from the customer.

6.5.2 Membership

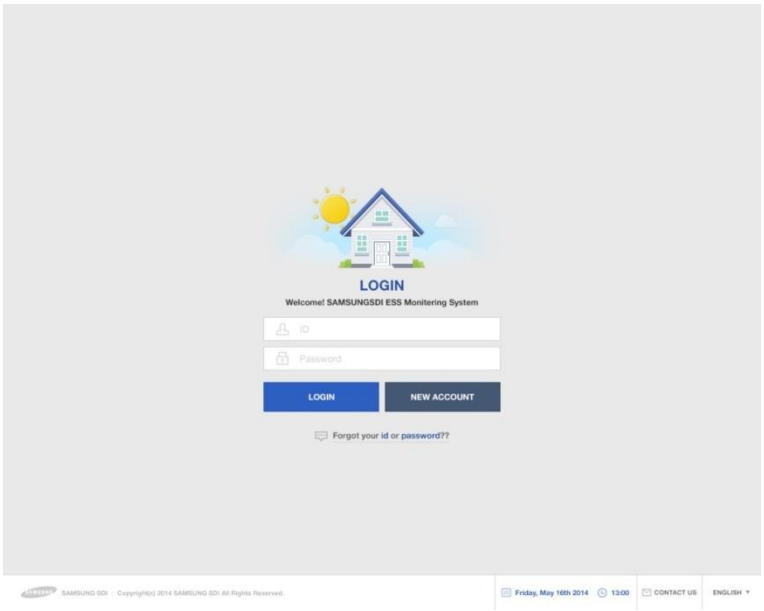
To use the service, you must register for membership through the homepage. During membership registration, the member's information such as ID, password, name and the address are collected and additional data can also be collected to provide statistical information upon the customer's approval.

6.5.3 Membership Withdrawal

For a customer who does not want to use the service, membership withdrawal is possible through the personal information modification menu on the homepage.

6.5.4 Log-In

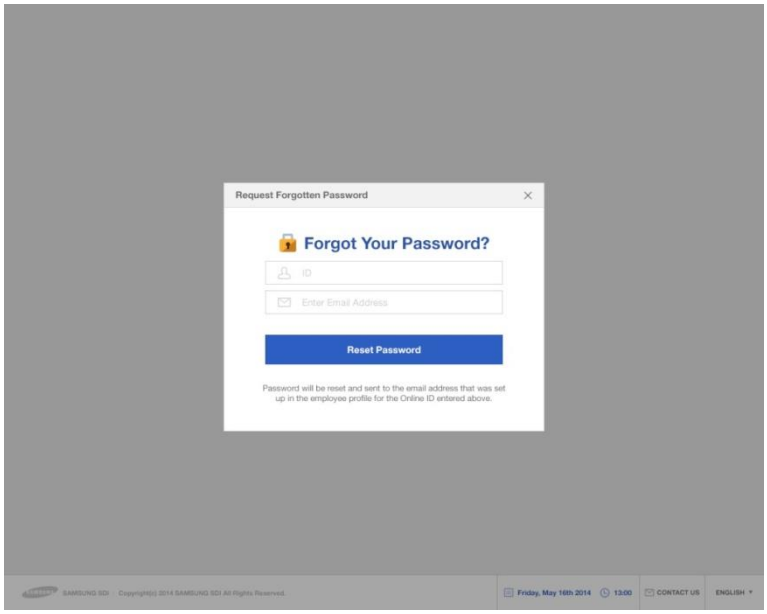
Log-in to the homepage through the ID and the password generated through membership registration. If you are not logged in, normal service use is not possible.
Also, if a log-in ID error or a password error occurs five consecutive times, access is blocked for 10 minutes for security, and access permitted afterwards, therefore, please take care.



Log-in Page

6.5.5 Password Initialization

For a customer who forgets their password during use, the password initialization menu can be used on the homepage to initialize the password. In the log-in page, select the “Forgot your id or password?” menu, and when the customer confirms the ID and the e-mail address filled in during the membership registration, the initialized password is sent to the registered e-mail address.


Request Forgotten Password
Forgot Your Password?
ID
Enter Email Address
Reset Password
Password will be reset and sent to the email address that was set up in the employee profile for the Online ID entered above.

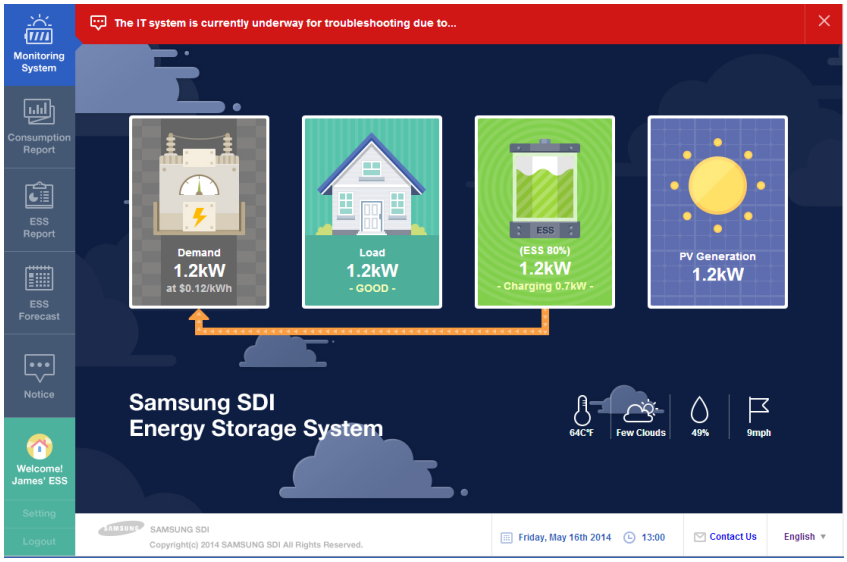
Password initialization screen

6.5.6 How to Use the Service

After completing log-in, normal service use is possible. This service currently provides menus of monitoring, consumption report, ESS report, ESS forecast, and notice. (Enabled to modify after further update.)

6.5.6.1 Monitoring

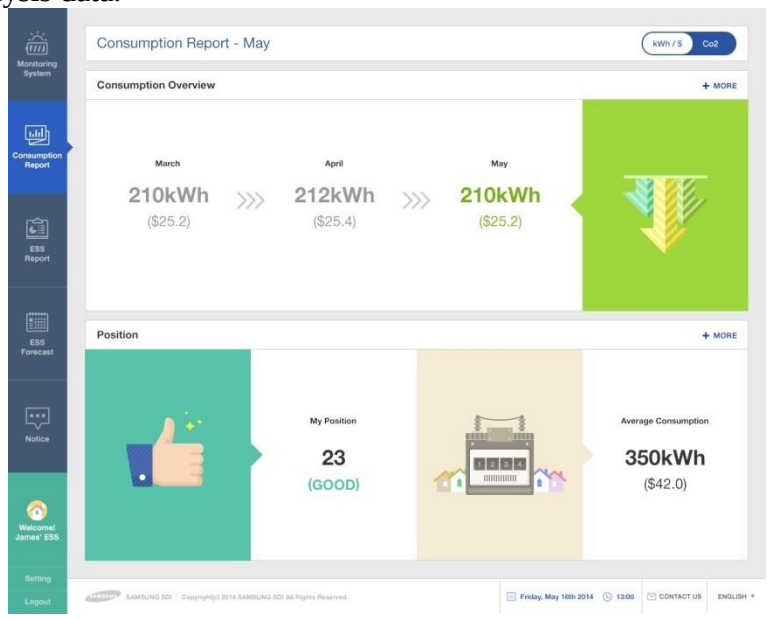
The operation status of the current product is indicated. The operation status of the product or the customer power usage information, generation amount information can be checked in real-time. Furthermore, event codes which occurred during run time can be checked on the monitoring page. Details of the event codes can be checked by clicking the exclamation marks which are popped up on the ESS icon. If internet is not available, customers cannot check the event codes.



Monitoring page

6.5.6.2 Consumption Report

The household power usage information collected during smart meter linkage is provided. In particular, information such as household type, size, and inhabiting manpower collected according to the customer approval are used to provide various types of statistics and comparative analysis data.



Consumption report page

6.5.6.3 ESS Report

In the ESS Report page, various types of data generated through ESS operation can be checked. The amount of energy charged or discharged can be checked through the ESS, and other data comparison with solar energy production amount or the power sales amount is possible.

6.5.6.4 ESS Forecast

In the ESS Report page, various types of data generated through ESS operation can be checked. The amount of energy charged or discharged can be checked through the ESS, and other data comparison with solar energy production amount or the power sales amount is possible.

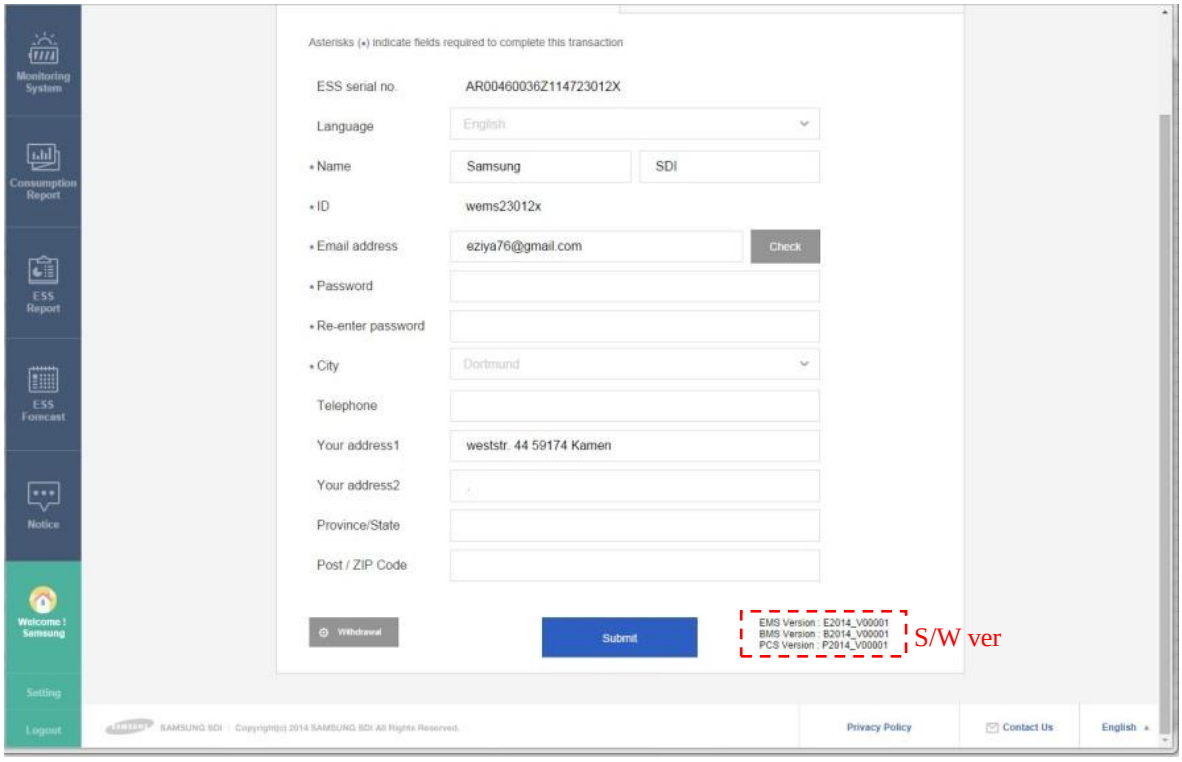
Forecast page

6.5.6.5 Notice

When there is an update or other changes in the service, the notice message can be checked.

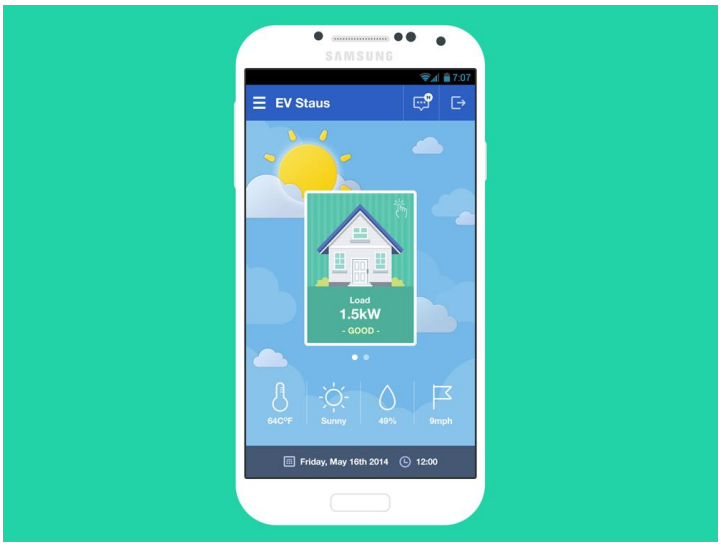
6.5.6.6 S/W ver. check

The software version of the product can be checked on the monitoring page.



6.5.7 Mobile Service

For customers using Android or I-Phone, the product status can be easily checked on the move through the smart phone. To use the mobile service, the customer must first register the membership through the webpage and use the ID and the password to log-in and use the service.



Mobile service

7 Input of Installation Information

Initial installation information needs to be input through the following procedure for operation information of this system can be monitored appropriately on server.

7.1 Information Entering Administrator

The installer needs to input installation information by using laptop or smart phone

7.2 System Information Input Flow

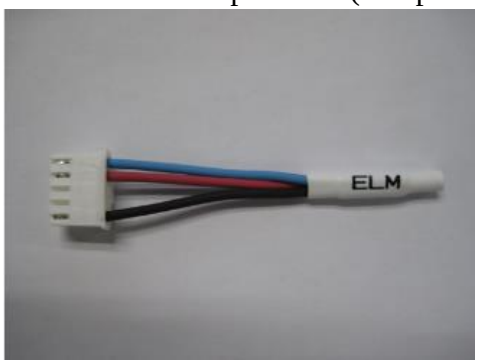
1st Step : Direct Connection to PC -> Input Local Setting Value
2nd Step : Connection to Web Page -> Input Webpage Setting Value

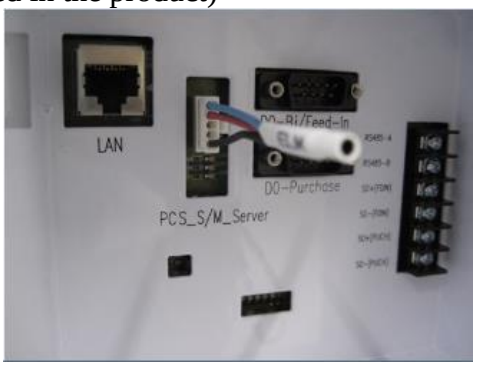
7.3 Input PC Direct Connection and Local Setting Value

7.3.1 PC Direct Connection Flow and Input

System Off Status -> Insert Jumper Wire, Connect PC LAN cable
-> System AC on -> PC Direct Connection -> Input Setting Value
-> System off -> Remove Jumper Wire -> Connect Internet LAN Cable

7.3.2 Insert Jumper Wire (Not provided in the product)





7.3.3 LAN cable connection between PC and System

7.3.3.1 LAN Cable Type

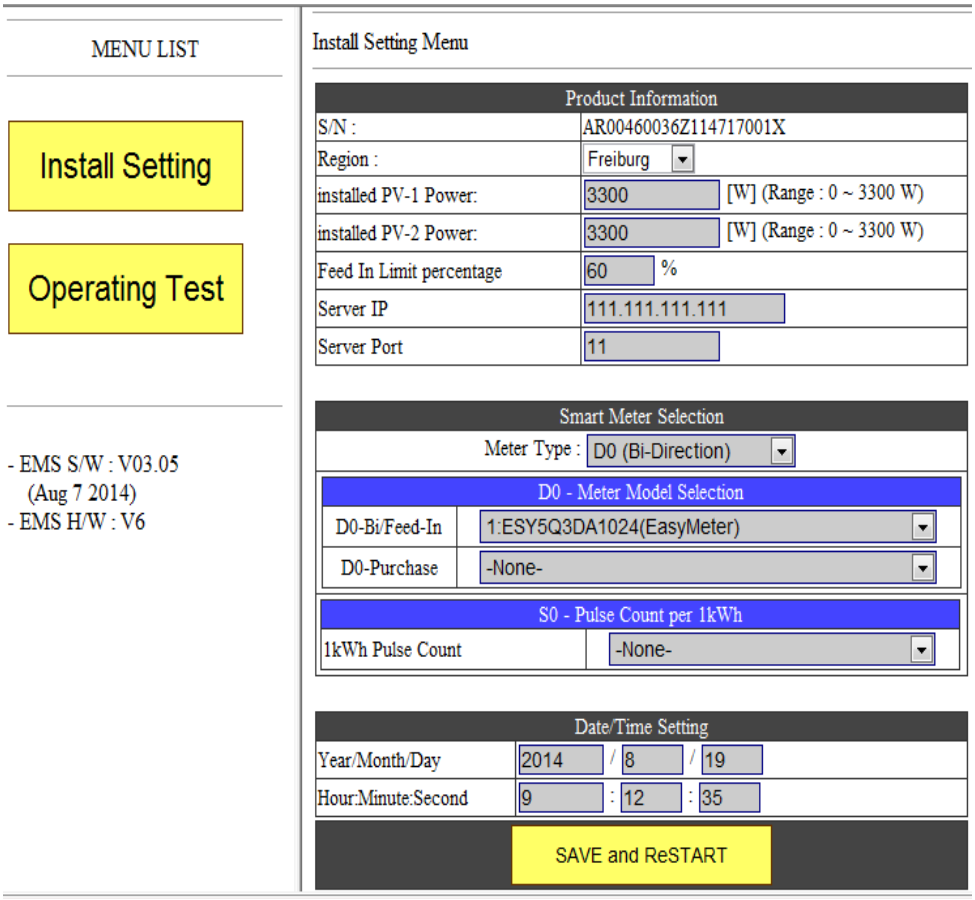
- UTP cable/category 5E
- 1:1 direct cable

7.3.4 Connecting SIM(System Install Manager)

7.3.4.1 Connection URL

- http://17.91.23.196:8000

7.3.4.2 Connection Screen



7.3.5 Input Setting Value

7.3.5.1 S/N

Input value for shipment from factory, modification is not available

7.3.5.2 Region

Choose and input city for installation (within menu)

7.3.5.3 PV Install Value

Input installation capacity of each PV string

Input by typing in person

7.3.5.4 Sever IP & Port

Input as basic value.

Perform modification for modification issue only.

7.3.5.5 Smart Meter Selection

7.3.5.5.1 Meter Type

D0(Bi-Direction)

D0(Uni-Direction)

Select S0(Pulse Count)

7.3.5.5.2 D0 Meter model selection

Input when Meter Type is D0

D0-bi/feed-In :

Choose and input for inter-direction meter connection,
or choose one-direction feed-in type

D0-Purchase : choose one-direction purchase type

7.3.5.5.3 S0 Pulse Count per 1kWh

Input when Meter Type is S0

S0 : 100 pulse/kWh
S0 : 1000 pulse/kWh
S0 : choose 10000 pulse/kWh

7.3.5.6 Date/Time setting

Input current date and time

7.3.5.7 Save and Restart

Save into system after the aforementioned items are all input

7.3.5.8 Grid Feed in Limit Regulation Setting

In some countries that have a regulation for the grid feed in limit, we support the function for the installer to set up the limit value. You can select the required limit value in the [Feed in Limit Percentage] in the set up screen. The selectable value is 0%,60%,70%,80%,90%,100%. 100% means no grid feed in limit.

7.4 Web Page Connection and Input

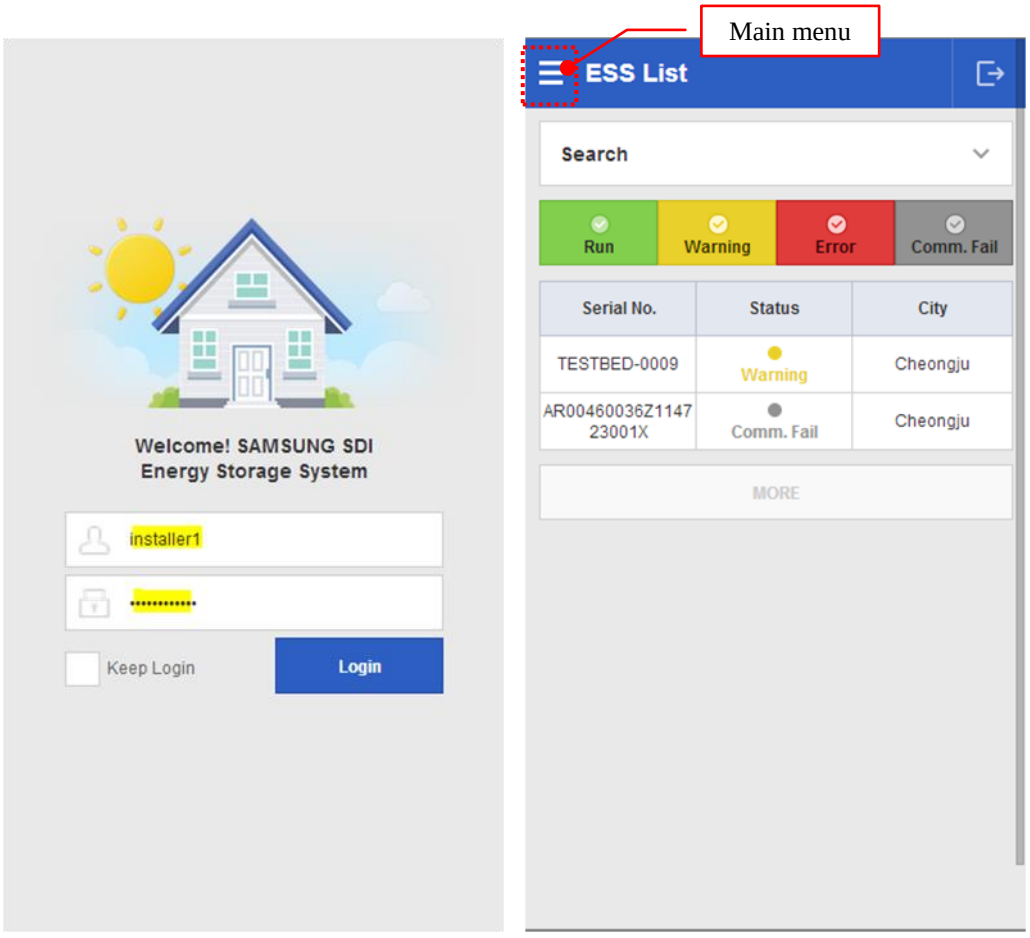
7.4.1 Web Page Connection

Open internet browser of laptop or smart phone then input designated address then system information input page pops up.

Input URL : https://myess.samsungsdi.com/engineer/main.do or https://112.106.12.149/engineer/main.do

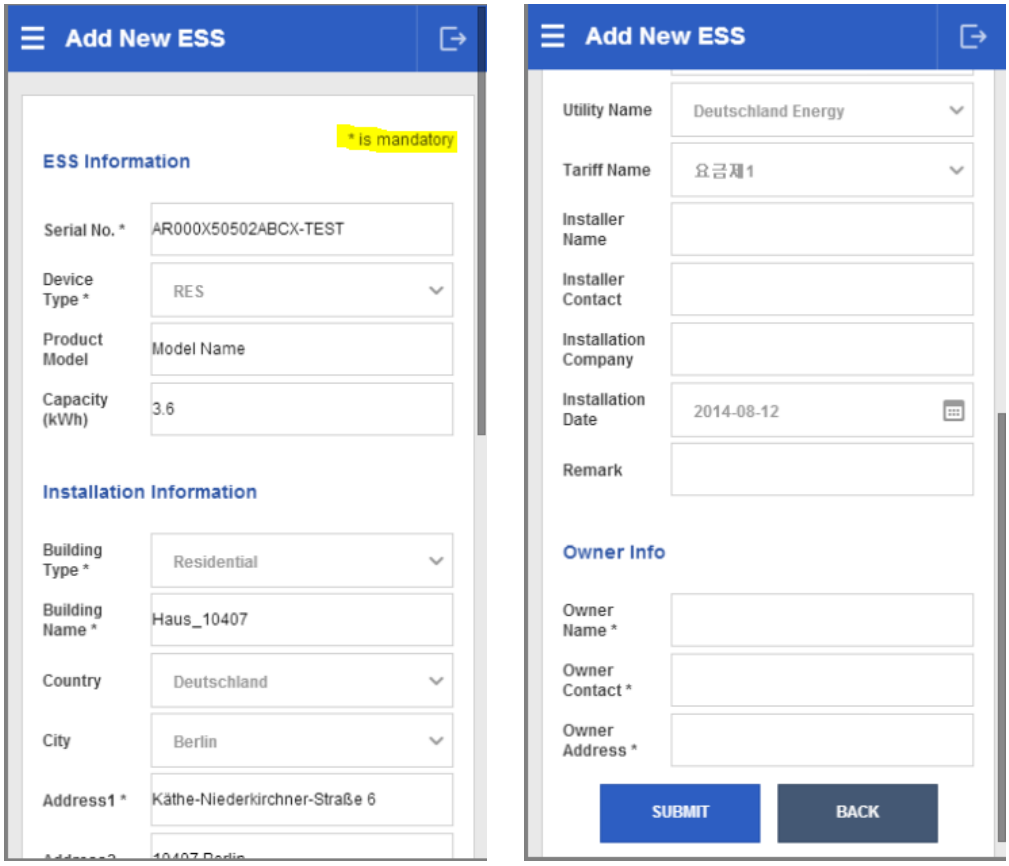
7.4.2 Login & “ESS List” menu

Input your ID and password for engineers. And you can see the list of ESS.



7.4.3 Add new ESS Information

Click main menu and select “Add New ESS”. And input ESS information, installation information and owner information. The data input include ESS UID, service date, installation date, installer information, phone number, address, city information, national code and these can differ according to product model and version. After finished to input information, click ″Submit” button. And if it is saved successfully, you can see a success message.

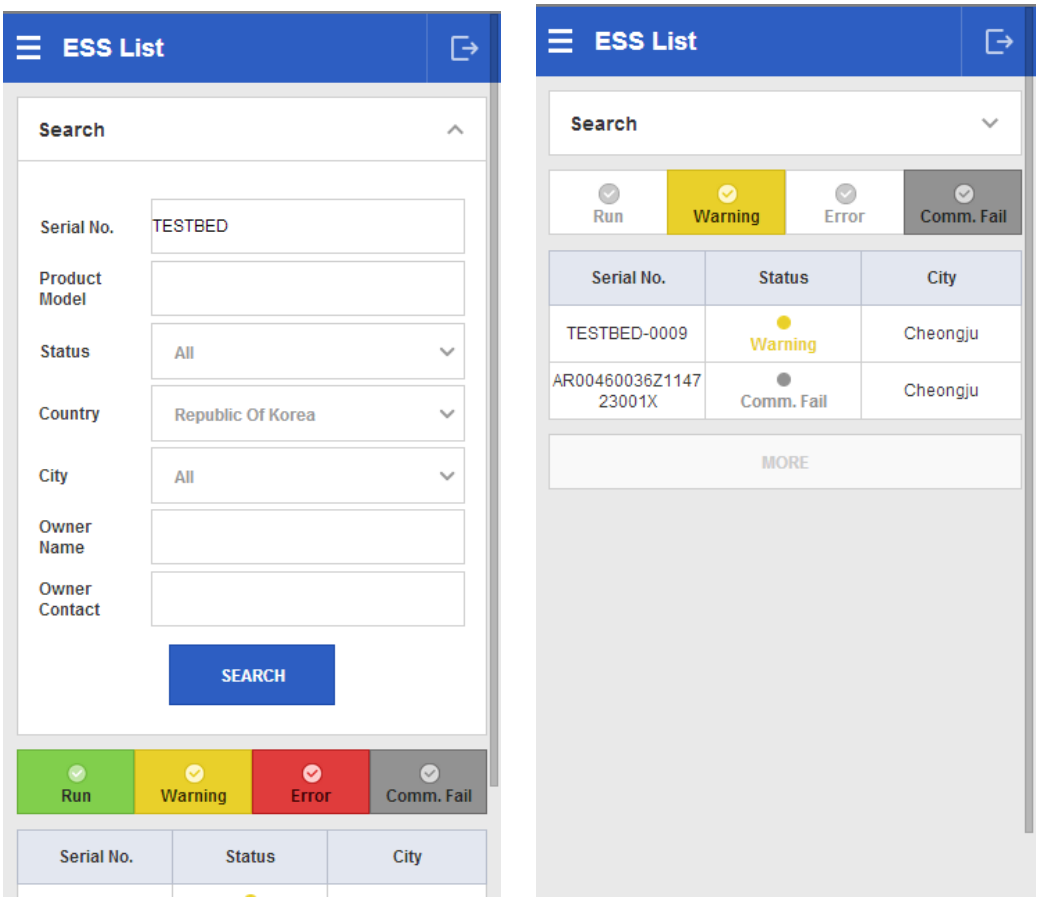


Information	Description
Serial No.	Write serial number of ESS
Device Type	Select a type of ESS, e.g.)AIO is RES
Battery No.	Write serial number of battery
Product Model	Write model code of ESS e.g.) AIO is ELSR362-00001
Capacity	Write battery capacity, e.g.) AIO is 3.6
Building Type	Select a type of building
Building Name	Write building’s name e.g.) JACK’s HOME
Country	Select a country
City	Select a city which ESS is located
Address1	Write an address of location
Address2	Write an address of location
Utility Name	Select an utility for the customer
Tariff Name	Select a tariff for the customer
Installer Name	Write installer’s name or company name

Installer Contact	Write install’s contact or company contact
Installation Company	Write installer’s company name
Installation Date	Select an installation date
Remark	Write a something important to remark
Owner Name	Write owner’s name
Owner Contact	Write owner’s contact
Owner Address	Write owner’s address

7.4.4 Check current state of ESS

Click main menu and select “ESS list”. And click ″Search” menu. If you input search keywords and click ″Search” button, you can see current status of ESS

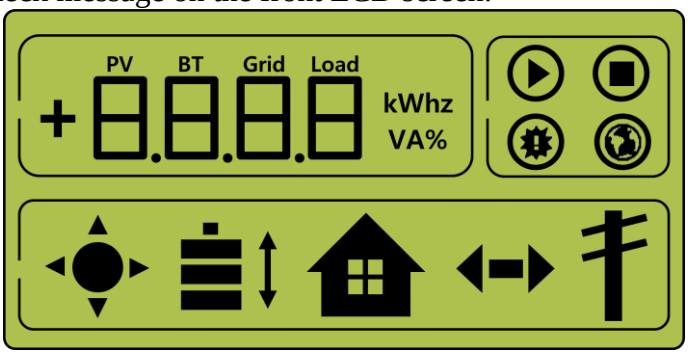


8 Operation Test

8.1 Starting the System

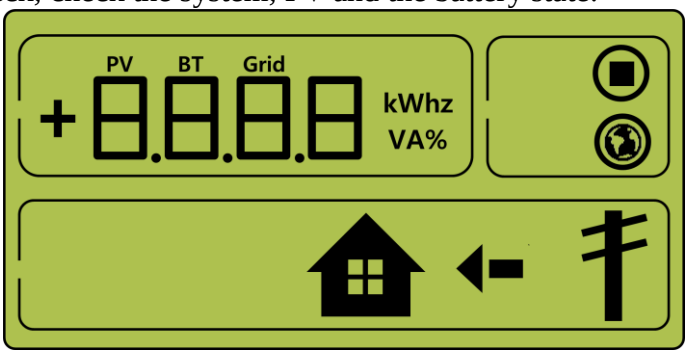
After completing the installation, turn on the AC circuit breaker and DC disconnect switch installed in the distribution box. (See the section 5.7)

Check the system check message on the front LCD screen.



< Initial indication screen on power on >

After the system check, check the system, PV and the battery state.



<Standby state indication screen before the EMS command >

Receive the command from the EMS to convert to operation mode. For each operation mode screen, refer to 8.3.
On the occurrence of event message, refer to 8.3.7.

8.2 System Turn-off Method

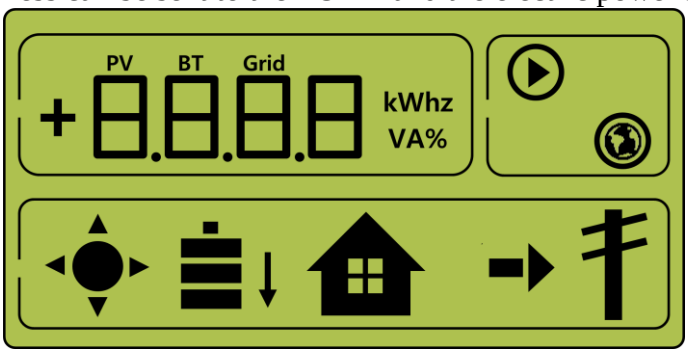
To turn-off the system, push down the manual AC circuit breaker and DC disconnect switch in the distribution box.

8.3 Operation Mode Description

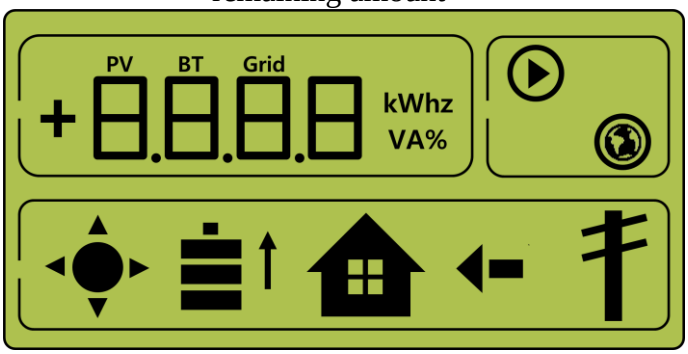
This system is composed of six modes - PV Auto, PV Only, Battery discharge, Standby, A/S(forced charge) mode, and Stand-alone mode. Otherwise, there exists event check status, which is not categorized as a mode.

8.3.1 PV-Auto Mode

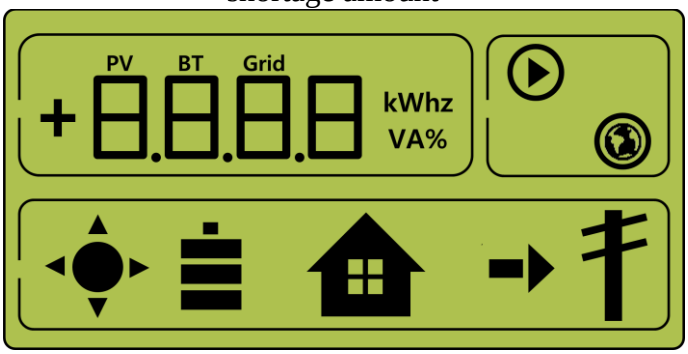
Solar energy generation is possible and battery charge-discharge is possible. The solar energy generation power is charged or discharged to the battery through the EMS decision. Maximum 4.6kW or less can be sent to the LOAD and the electric power system.



< Indication screen_1: Solar energy generation (Large), battery charge, home use, sell remaining amount >



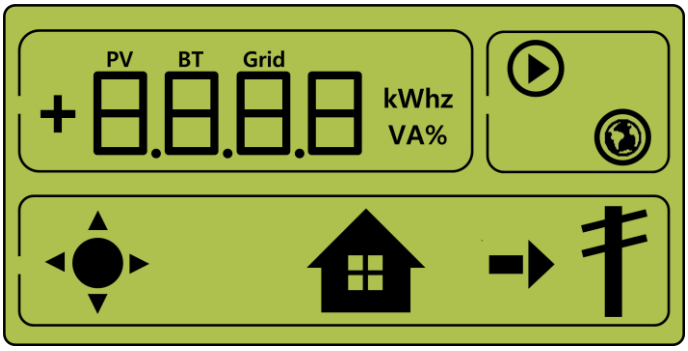
< Indication screen_2: Solar energy generation (small), battery discharge, Home use, buy shortage amount>



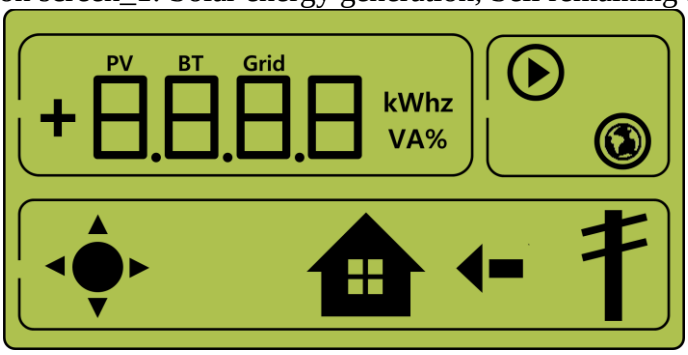
< Indication screen_3:
Solar energy generation, Battery standby, Home use, sell remaining amount >

8.3.2 PV-Only Mode

This is the state enabled for solar energy generation. However, the battery charge-discharge does not operate. Maximum 4.6kW or less of solar energy generation power can be sent to the LOAD and the system through the EMS decision.



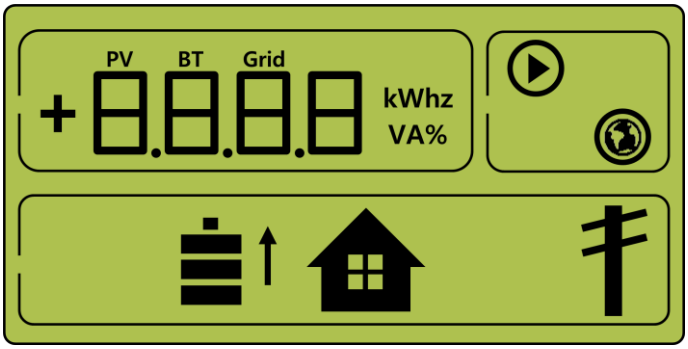
< Indication screen_1: Solar energy generation, Sell remaining amount >



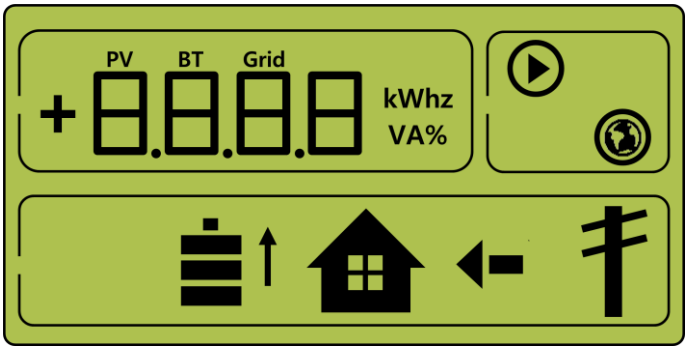
< Indication screen_2: Solar energy generation, Buy shortage amount >

8.3.3 Battery-Discharge Mode

This is the state of having no solar energy generation. Only battery discharge is possible. By the EMS decision, the battery discharge power can be sent maximum 2kW or less only to the LOAD.



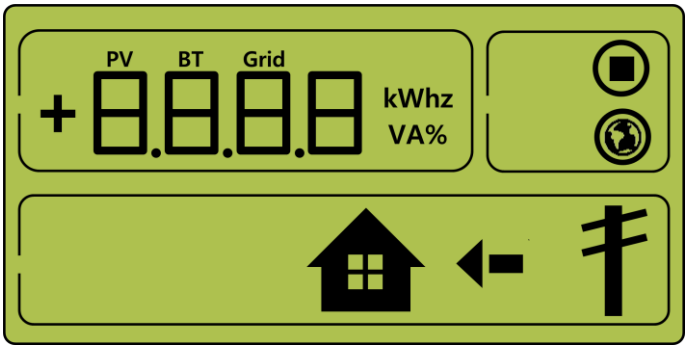
< Indication screen_1: Battery discharge, Home use >



< Indication screen_2: Battery discharge, Home use, Buy shortage amount >

8.3.4 Standby Mode

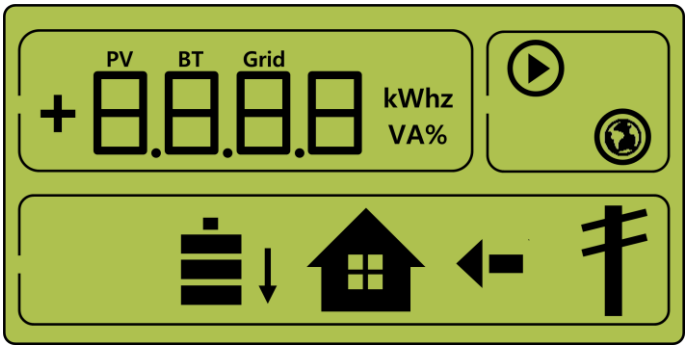
This is the standby state before converting to the operation mode (PV Auto, PV Only, Battery discharge mode). Conversion to the operation mode (PV Auto, PV Only, Battery discharge mode) is made by the EMS decision.



< Indication screen on Standby Mode >

8.3.5 Forced-Charge Mode (A/S mode)

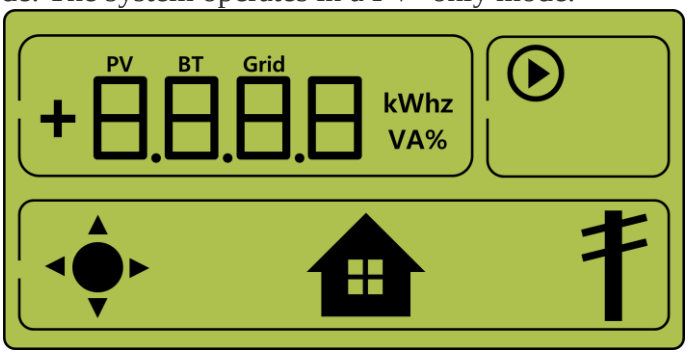
This is the forced charge mode of the battery in system check. (Solar energy generation is not used.) This is the state where the power continuously flows from the electric power system to the battery.



< Indication screen on Forced charged Mode >

8.3.6 Stand-Alone Mode

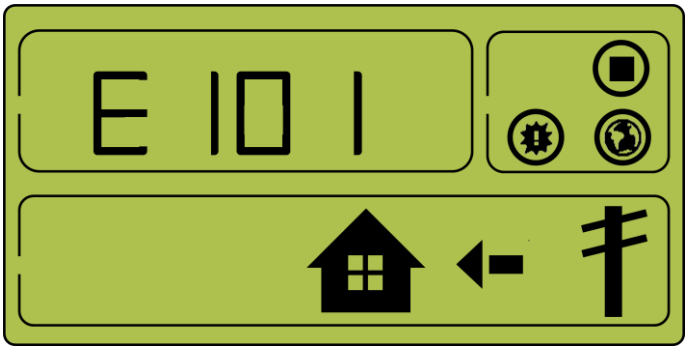
When the All in One is disconnected from the smart meter or the power conversion system is disconnected from the EMS(energy management system), the All in One system enters into the Stand-Alone Mode. The system operates in a PV- only mode.



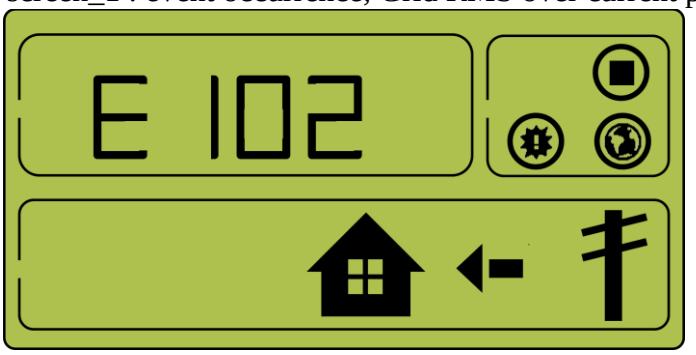
< Indication screen on stand-alone mode >

8.3.7 Event Checking Status

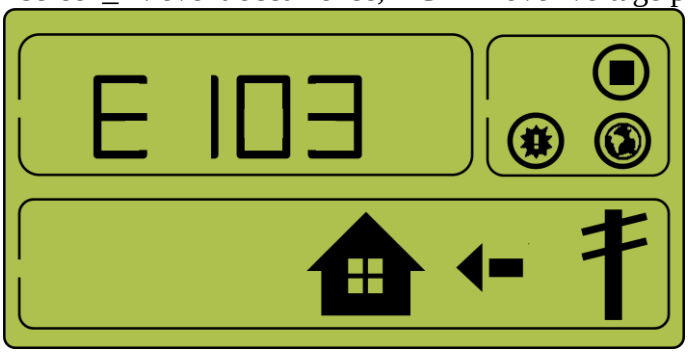
This is the mode of stopping and standby generation on event occurrence.



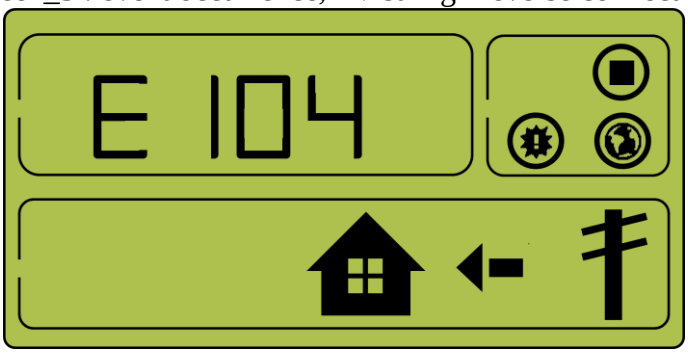
<Indication screen_1 : event occurrence, Grid RMS over current protection>



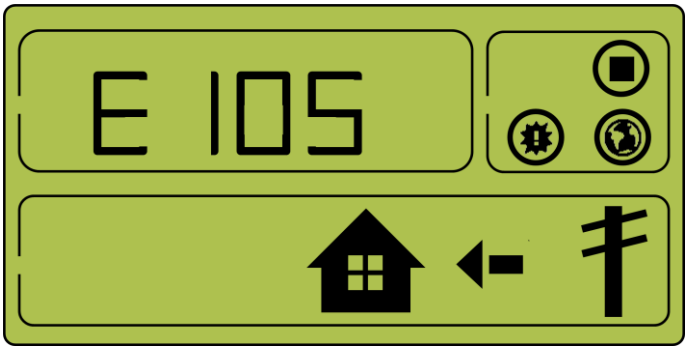
<Indication screen_2 : event occurrence, DC link over voltage protection>



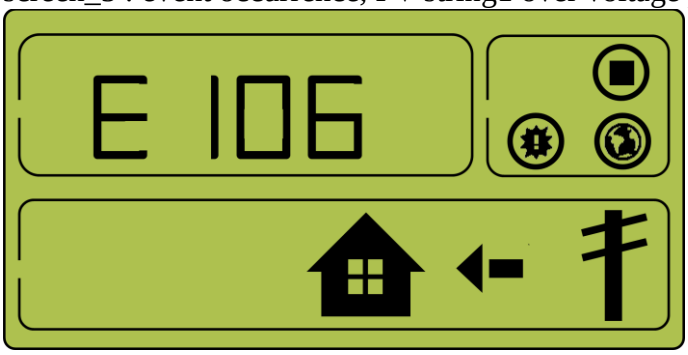
<Indication screen_3 : event occurrence, PV string1 reverse connection protection>



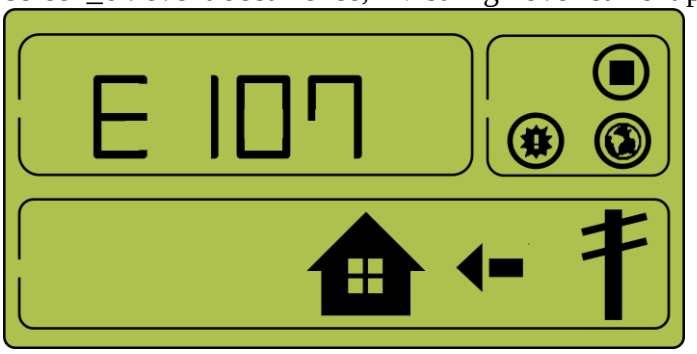
<Indication screen_4 : event occurrence, PV string2 reverse connection protection>



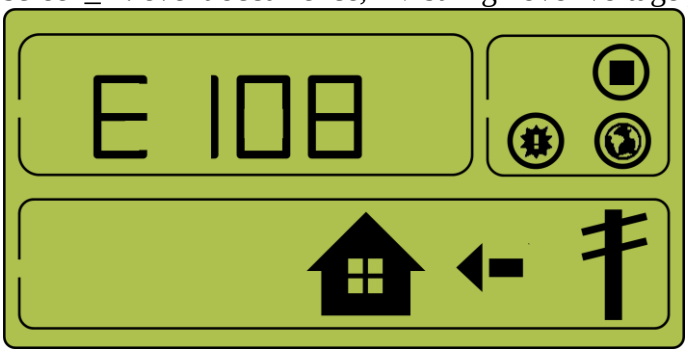
<Indication screen_5 : event occurrence, PV string1 over voltage protection>



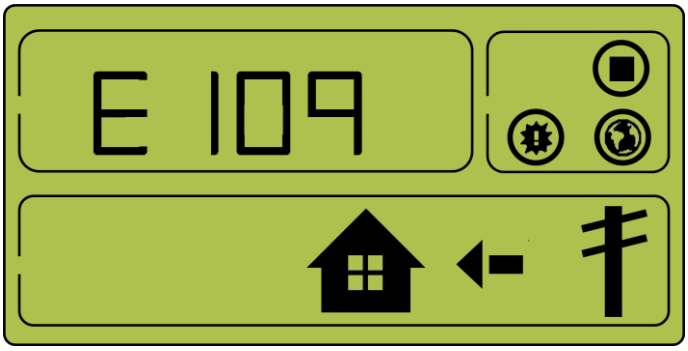
<Indication screen_6 : event occurrence, PV string1 over current protection>



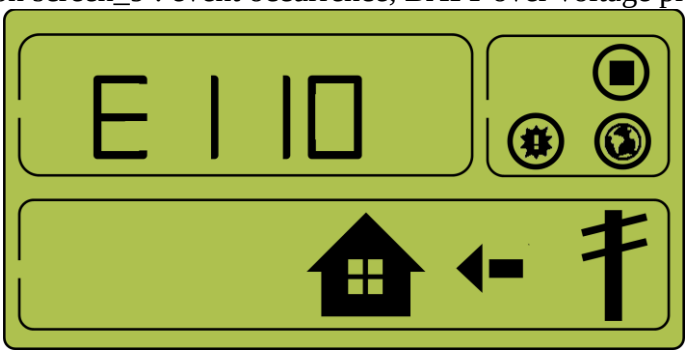
<Indication screen_7 : event occurrence, PV string2 over voltage protection>



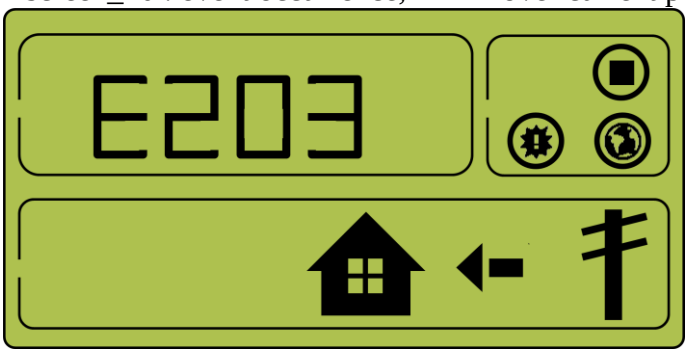
<Indication screen_8 : event occurrence, PV string2 over current protection>



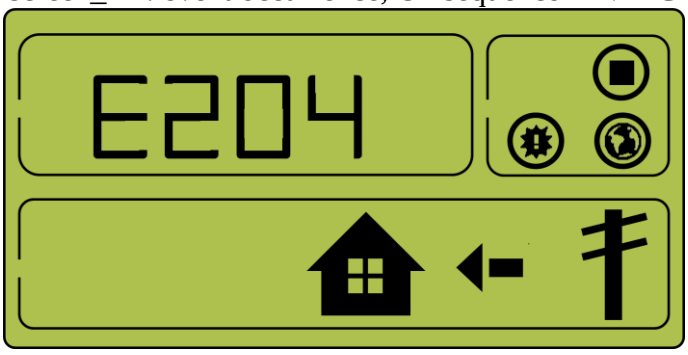
<Indication screen_9 : event occurrence, BATT over voltage protection>



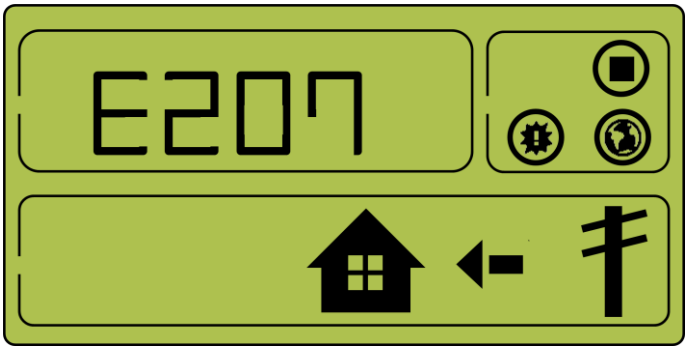
<Indication screen_10 : event occurrence, BATT over current protection>



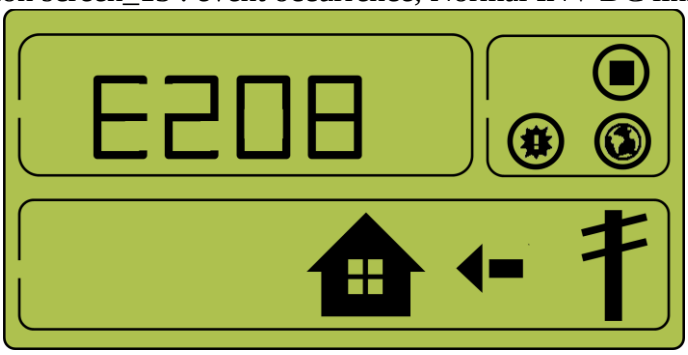
<Indication screen_11 : event occurrence, On sequence INV DC link event>



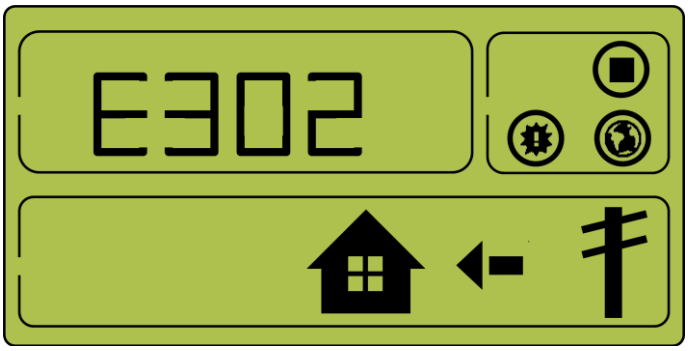
<Indication screen_12 : event occurrence, On sequence BATT V & BATT I event>



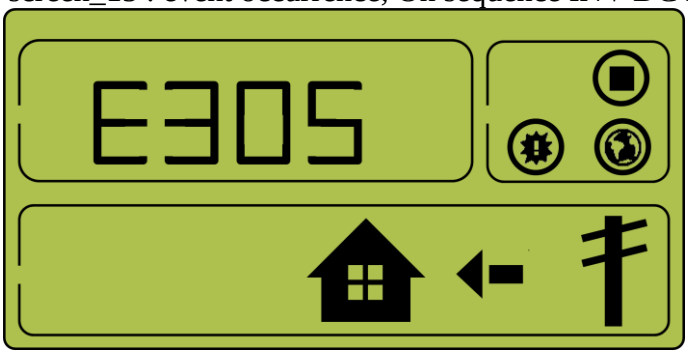
<Indication screen_13 : event occurrence, Normal INV DC link event>



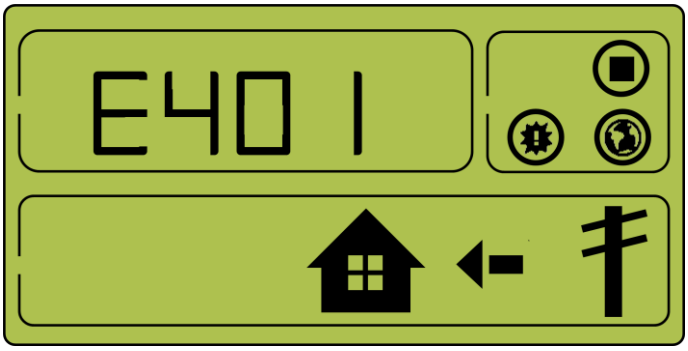
<Indication screen_14 : event occurrence, Normal BATT V & BATT I & BDC DC link event>



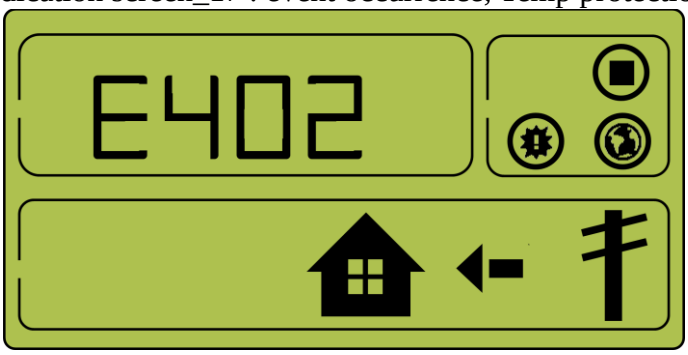
<Indication screen_15 : event occurrence, On sequence INV DC link event>



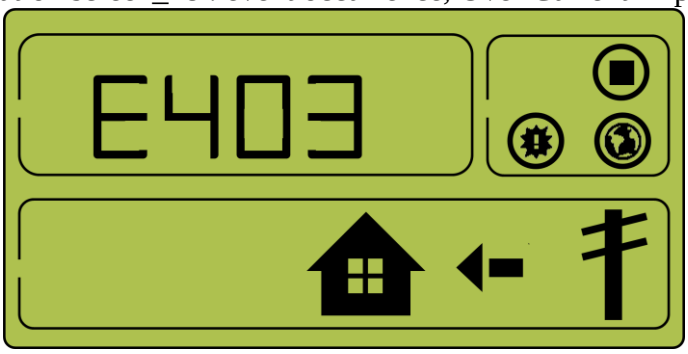
<Indication screen_16 : event occurrence, Normal INV DC link & PV I event>



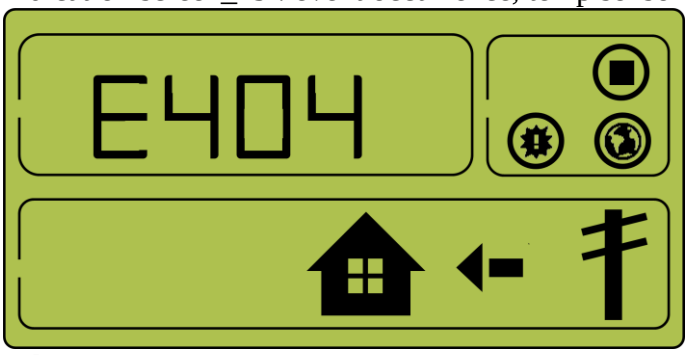
<Indication screen_17 : event occurrence, Temp protection>



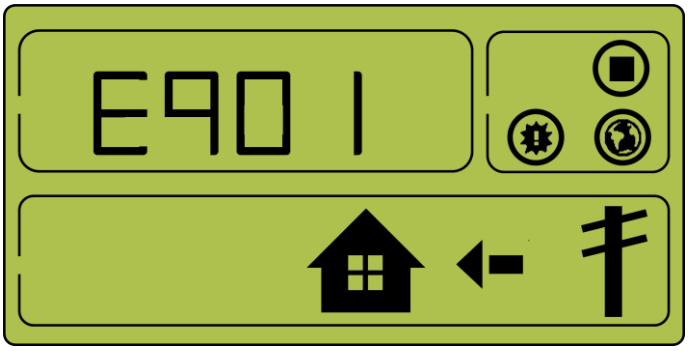
<Indication screen_18 : event occurrence, Over Current Tripzone>



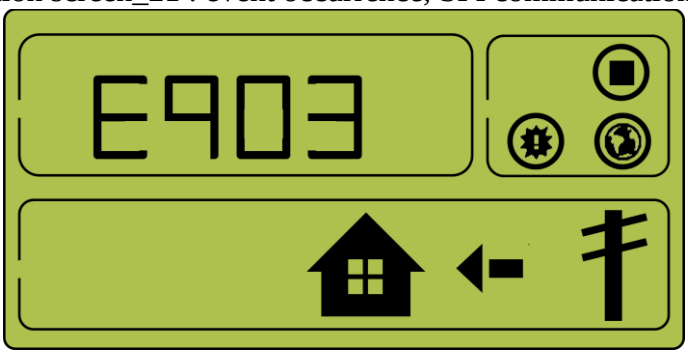
<Indication screen_19 : event occurrence, temp sensor>



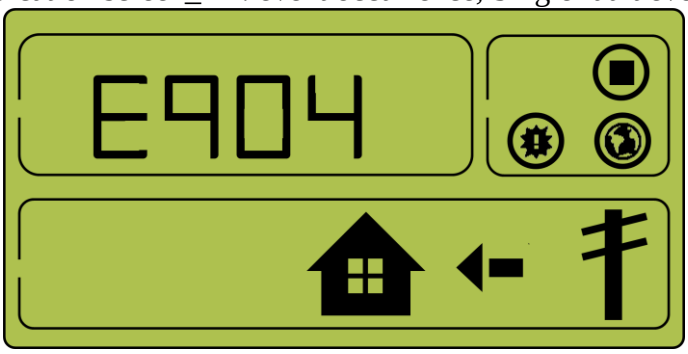
<Indication screen_20 : event occurrence, PV common>



<Indication screen_21 : event occurrence, SPI communication event>

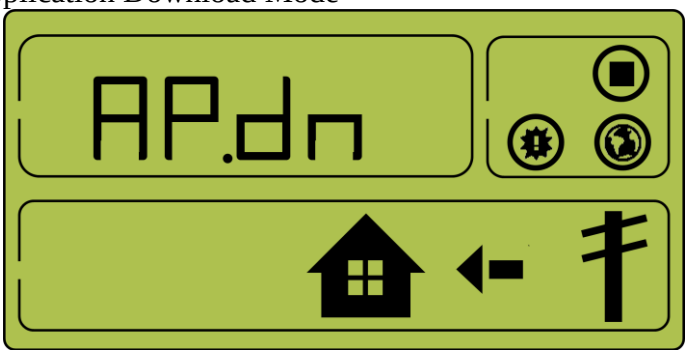


<Indication screen_22 : event occurrence, Single fault event>



<Indication screen_23 : event occurrence, Continuously 3 times PCS fault>

8.3.8 Application Download Mode



<Indication screen on Application Download Mode >

9 Problem confirmation

Checking event codes are available in the website (https://myess.samsungsdi.com). If internet is not available, customers cannot check the event codes.

9.1 General Events

The general event is composed of warning and protection. The warning level events do not affect the change in the product mode, and are automatically restored when solving the problem. In this case, problem solving is enabled according to the change in the time and operation status / condition.

On protection level event occurrence, the system stops, and is automatically restored when solving the problem. In this case, problem solving is enabled according to the change in the time and operation status / condition.

9.1.1 PCS General Events (Warnings)

Type	Code	Description	Measures
WARNING	E001	GRID UNDER VOLTAGE	Occurs below the standard level of system voltage. This is the overall voltage-current warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E002	GRID OVER VOLTAGE	Occurs above the standard level of system voltage. This is the overall voltage-current warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E003	BATT UNDER VOLTAGE	Occurs below the standard level of battery energy voltage. This is the overall voltage-current warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E004	BATT OVER VOLTAGE	Occurs above the standard level of battery energy voltage. This is the overall voltage-current warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.
	E005	FAN WARNING	Occurs when the Fan operation is abnormal. This is the overall Fan warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.

	E006	BATT CONNECTION WARNING	Occurs when the battery connection is abnormal. This is the connection warning message, with no special change in the sequence. The warning message disappears when converted to the normal state.

9.1.2 PCS General Events (Protection)

Type	Code	Description	Measures
PROTECTION	E101	GRID RMS OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E102	DC LINK OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E103	PV STRING1 REVERSE CONNECTION PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E104	PV STRING2 REVERSE CONNECTION PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E105	PV STRING1 OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E106	PV STRING1 OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears.

			After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E107	PV STRING2 OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E108	PV STRING2 OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E109	BATT OVER VOLTAGE PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
	E110	BATT OVER CURRENT PROTECTION	The operation mode is terminated in most significant PROTECTION Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

9.1.3 Battery Discharge General Events

Type	Code	Description	Measures
PROTECTION	E201	ON SEQUENCE GRID OFF	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E202	ON SEQUENCE BATT STATUS EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is

			automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E203	ON SEQUENCE INV DC LINK EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E204	ON SEQUENCE BATT V & BATT I EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E0205	NORMAL GRID OFF	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E206	NORMAL BATT STATUS EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E207	NORMAL INV DC LINK EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E208	NORMAL BATT V & BATT I & BDC DC LINK EVENT	During Battery Discharge operation, Battery Discharge operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is

			automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

9.1.4 PV General Events (Protection)

Type	Code	Description	Measures
PROTECTION	E301	ON SEQUENCE GRID OFF	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E302	ON SEQUENCE INV DC LINK EVENT	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E303	ON SEQUENCE PV V EVENT	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E304	NORMAL GRID OFF	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E305	NORMAL INV DC LINK & PV I EVENT	During PV generation mode operation, the PV generation mode operation is terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E306	NORMAL PV V EVENT	During PV generation mode operation, the PV generation mode operation is

			terminated through the protection function. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.

9.1.5 ETC General Events (Protection)

Type	Code	Description	Measures
PROTECTION	E401	TEMP Protection	Occurs when the switch temperature is high. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E402	OVER CURRENT TRIPZONE	Occurs on PCS hardware protection. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal. If it is not removed until the time limit, it is converted to significant event.
PROTECTION	E403	TEMP SENSOR	Occurs when the Temp sensor connection is abnormal. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal.
PROTECTION	E404	PV COMMON	Occurs when the PV common states is abnormal. Wait until the event message disappears. After the event message is removed, it is automatically restored to normal.

9.1.6 BMS General Events

Type	Code	Description	Measures
WARNING	E501	OVER VOLTAGE PROTECTION-CELL	Occurs when the Max. cell voltage is above Warning level Automatically restored to normal state when the Max. cell voltage comes below the limit value
PROTECTION	E502	OVER VOLTAGE PROTECTION-CELL	System stops when the Max. Cell voltage is above Protection level. Automatically restored to normal state when the Max. Cell voltage comes below the limit value
WARNING	E503	UNDER VOLTAGE PROTECTION-	Occurs when the Min. cell voltage is below Protection level.

		CELL	Automatically restored to normal state when the Min. Cell voltage goes above the limit value
PROTECTION	E504	UNDER VOLTAGE PROTECTION-CELL	System stops when the Min. cell voltage is below Protection level. Automatically restored to normal state when the Min. Cell voltage goes above the limit value
WARNING	E505	OVER TEMP. PROTECTION-CELL	Occurs when the Max. Cell temperature is above Protection level. Automatically restored to normal state when the Max. Cell temperature comes below the limit value
PROTECTION	E506	OVER TEMP. PROTECTION-CELL	System stops when the Max. Cell temperature is above Protection level. Automatically restored to normal state when the Max. Cell temperature comes below the limit value
WARNING	E507	UNDER TEMP. PROTECTION-CELL	Occurs when the Min. cell temperature is below Protection level. Automatically restored to normal state when the Min. Cell temperature goes above the limit value
PROTECTION	E508	UNDER TEMP. PROTECTION-CELL	System stops when the Min. cell temperature is below Protection level. Automatically restored to normal state when the Min. Cell temperature goes above the limit value
WARNING	E509	CELL VOLTAGE IMBALANCE PROTECTION	Occurs when the imbalance of the Cell voltage is above limit value Restored to normal state when the imbalance of the Cell voltage is below limit value
PROTECTION	E510	CELL VOLTAGE IMBALANCE PROTECTION	Occurs when the imbalance of the Cell voltage is above limit value Restored to normal state when the imbalance of the Cell voltage is below limit value
WARNING	E511	AFE INITIALIZATION	AFE initialization failure Restored to normal mode on AFE initialization success
PROTECTION	E512	AFE INITIALIZATION	AFE communication failure
WARNING	E513	CELL TEMP SENSOR 1EA	Occurs above the standard level of Battery cell temp.
PROTECTION	E514	CELL TEMP SENSOR 2EA	Occurs above the standard level of Battery cell temp.

9.1.7 EMS/Communication Events

Type	Code	Description	Measures
WARNING	E601	PCS CAN EVENT	• Turn off and restart the system • Reconnect the communication line between the EMS board and the DSP board.
WARNING	E602	ETHERNET EVENT	• Disconnect and reconnect the LAN. • Turn off and restart the router • Make sure that the DHCP server function of router is activated. • Turn off and restart the system
WARNING	E603	SMART METER EVENT	• Make sure that the Meter device is properly selected. • Disconnect and reconnect the D0 cable. • Turn off and restart the system

9.1.8 Single Fault Events

Type	Code	Description	Measures
WARNING	E701	GRID UNDER VOLTAGE FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E702	GRID OVER VOLTAGE FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E703	GRID UNDER FREQUENCY FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E704	GRID OVER FREQUENCY FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E705	GRID TEN MINUTE AVERAGE FAULT	• The operation mode is terminated when power system event occurs. Restart 1 minute after electric power system event settled.
	E706	RCMU FAULT	• Turn off system power when the level of leakage current is over standard level. • Check leakage current level then restart or turn off for the level below standard and problem respectively.
	E708	PV INSULATION FAULT	• OFF Turn off system power if PV INSULATION RESISTANCE is of

			standard level. • Restart after 3 minutes
	E709	ANTI ISLANDING FAULT	• In case of electric power system black out, it automatically detects the state and turns off All in One. • Restart after 3 minutes
	E710	FUNCTIONAL SAFETY FAULT	• Occur in case of mismatching between the two MCU measuring values • Restart after 3 minutes if no problem found

9.2 Significant Events

On significant event, the system is basically stopped operation, installer must be contacted, and the problem must be solved by the installer for the system to be restored to normal operation.

Type	Code	Description	Measures
Significant	E901	SPI COMMUNICATION EVENT	Occurs on internal non-communication between the PCS. Contact the installer immediately.
	E902	CAN COMMUNICATION EVENT	Occurs on non-communication with the EMS. All in One System is operation converted to Stand Alone mode. Contact the installer immediately.
	E903	SINGLE FAULT EVENT	Occurs on system connection standard single fault over. Contact the installer immediately.
	E904	CONTINUOUSLY 3 TIMES PCS FAULT	When PCS FAULT is occurred three consecutive times, PCS HARD FAIL is judged to be occurred to stop the operation. Contact the installer immediately.
	E905	PV CROSS CONNECTION Permanent Fail	Occurs when the PV GND is cross-connected. Contact the installer immediately.
	E906	Cell Over Voltage Permanent Fail	Exceeding Cell Max voltage Contact the installer immediately.
	E907	Cell Under Voltage Permanent Fail	Abnormal decrease in Cell Min voltage Contact the installer immediately.

10 Maintenance

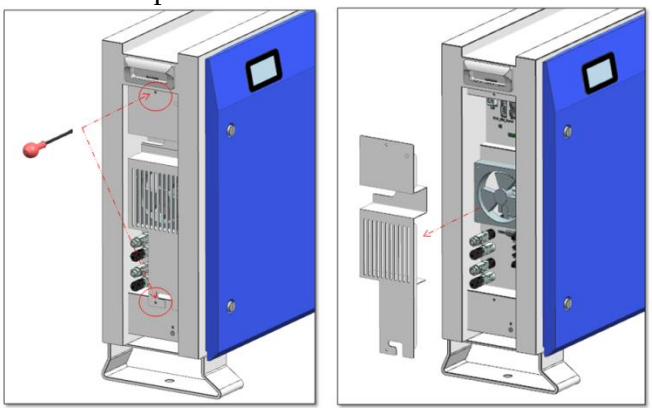
10.1 Fan and Cover Cleaning

Clean the fan according to the following procedures. It is recommended to clean the fan every six months.

Turn off the AC circuit breaker and DC disconnect switch in the distribution box and separate the Photovoltaic MC4 connector from the connector part located on the side of the 3.6kWh All in One.

Photovoltaic MC4 connector separation

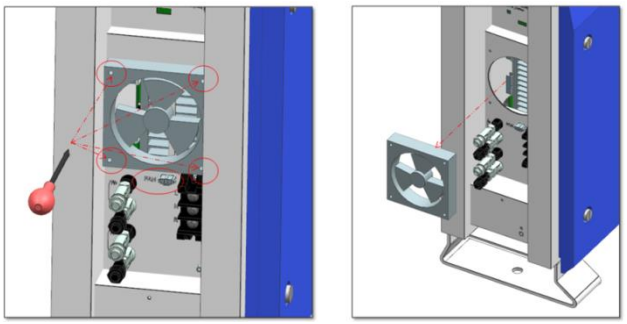
Separate the side cover. Do not separate the front case cover.



After separating the cover, clean with smooth brush, paint brush or wet cloth.

Separate the connector of the fan.

Separate the fan.



Clean the fan with smooth brush or wet cloth.

	Notice! Use of compressed air may damage the fan. ● In cleaning the fan, do not use compressed air, because it may damage the fan.

After cleaning, assemble all components in reverse order.

10.2 Various Components Check and Exchange

10.2.1 Fuse Check

Check every six months and on device failure.
Do not perform Fuse Check when the device is operating.
Perform after turning off the DC disconnect switch and the AC circuit breaker.
Measure both ends of the Inverter PBA (Specify in code when numbering the code in the future) F3, BDC PBA (Specify in code when numbering the code in the future) JF1 to check the resistance value.
If the resistance value is open state (Mega ohms or Infinite value), perform PBA exchange.

10.2.2 Input / Output Terminal Check

Perform the check every six months or on device failure.
Perform the input / output terminal check after turning off the AC circuit breaker and DC disconnect switch.
Do not perform when the device is operating.
Measure the input / output terminal with a multi-meter.
PV1 input (Specify in code when numbering the code in the future): CN13, CN14
PV2 input (Specify in code when numbering the code in the future): CN13, CN14
Battery input: CN17, CN27
AC output: CN1, CN4
If the resistance value is short state (close to 0), perform PBA exchange.

10.2.3 DC Link Check

Perform the check every six months or on device failure.
Perform DC link check after turning off the AC circuit breaker and DC disconnect switch.
Measure both ends of the DC link PBA (Specify in code when numbering the code in the future) CN1, CN2 with a multi-meter to check the resistance value.
If the resistance value is short state, perform PBA exchange.

10.2.4 FAN Operation Check

Perform the check every six months or on device failure.
Check the FAN operation frequently. In failure, it can cause fatal damage to the device.
Perform PV Auto Mode to check whether both fans are operating properly.
In the case of failure, contact the installer.

10.3 Battery Maintenance

It is recommended to perform battery maintenance check every six months.

	CAUTION! All works or service on the ESS and electrical connections must be supervised by personnel knowledgeable about batteries and the required precautions. When replacing battery trays, replace an old one with the same type and number of batteries or battery packs (check the type label or serial numbers/model numbers on battery trays).

	Standby for 40 minutes for complete discharge within the system before testing electrical parts inside the system! CAUTION! Do not dispose of batteries in a fire. The batteries may explode. CAUTION! Do not open or damage batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic. CAUTION! A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries. Remove watches, rings, or other metal objects. Use tools with insulated handles. Wear rubber gloves, eye protection glasses and boots when working on the battery systems. Do not lay tools or metal parts on top of batteries. Disconnect charging source prior to connecting or disconnecting battery terminals. Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

10.3.1 Battery Problem Check

On checking the event message (as noted in Chapter 9), check whether it is battery system significant event (subsection 9.2 significant event E901~E910).
If it is significant event, contact the installer or the maintenance personnel.
If it is significant event message related to the failure, exchange the battery. However, battery exchange is permitted only to the qualified person.
The battery exchange procedure is as described in 10.3.2.

10.3.2 Battery Exchange Procedure

Check whether there is main body and external electrical / communication connection line to be removed.
For the electric connection of the main body, block the AC circuit breaker and DC disconnect switch in the distribution box to remove the power.
For the MC4 connector connected to the Photovoltaic source, separate the male terminal and the female terminal.
Separate the AC cable connected to the terminal block in the AC line.
Remove the LAN communication cable.
For the complete electrical discharge of the main system, standby for 40 minutes. Remove the front case cover of the enclosure as described in Chapter 5.

Separate the battery electric connection connector (BATT-A: Connector on the BDC side, BATT-B: Connector on the battery side).
Separate the battery signal line (4 signal connectors).
Lay the main body down. Lay it so that the tray knob is visible. Work with at least two persons (Weight over 95 kg).
Unfasten the screw on the battery tray to separate from the main body.
Lift the battery tray for separation.
Place the main body and the battery tray on the packing box. This process is the reverse order of the installation process.

10.4 Replaceable Parts Listings

The list of parts replaceable for maintenance of this system is shown in the table below. For other parts, please refer to the application notes linked on the website of SAMSUNG SDI, or contact the installer or the service center.

No.	Part name	Manufacturer	Part number
1	Li-Ion Battery Tray	SAMSUNG SDI	-
2	PV connector	Muli-Contact AG c/o Stäubli Group	PV STICK
3	Fan1	Minebia manufacturing company	4710KL-04W-B59-E00
4	Fan2	Minebia manufacturing company	4710KL-04W-B59-E00

10.4.1 Li-Ion Battery Tray

The Li-Ion battery module can be replaced in case of failure. The 3.6kWh System uses a battery tray consisting of a 2-battery module manufactured by SAMSUNG SDI. When it is needed to replace the battery module, please contact SAMSUNG SDI with the item name and the serial number of the 3.6kWh All in One System.

Li_Ion Battery tray manufactured by SAMSUNG SDI

10.4.2 PV Connector

The PV connector can be replaced in case of damage. The PV connector used in the 3.6kWh All in One System consists of PV stick male/female parts manufactured by Multi-Contact AG c/o Stäubli Group.

PV Connector manufactured by Multi-Contact AG c/o Stäubli Group

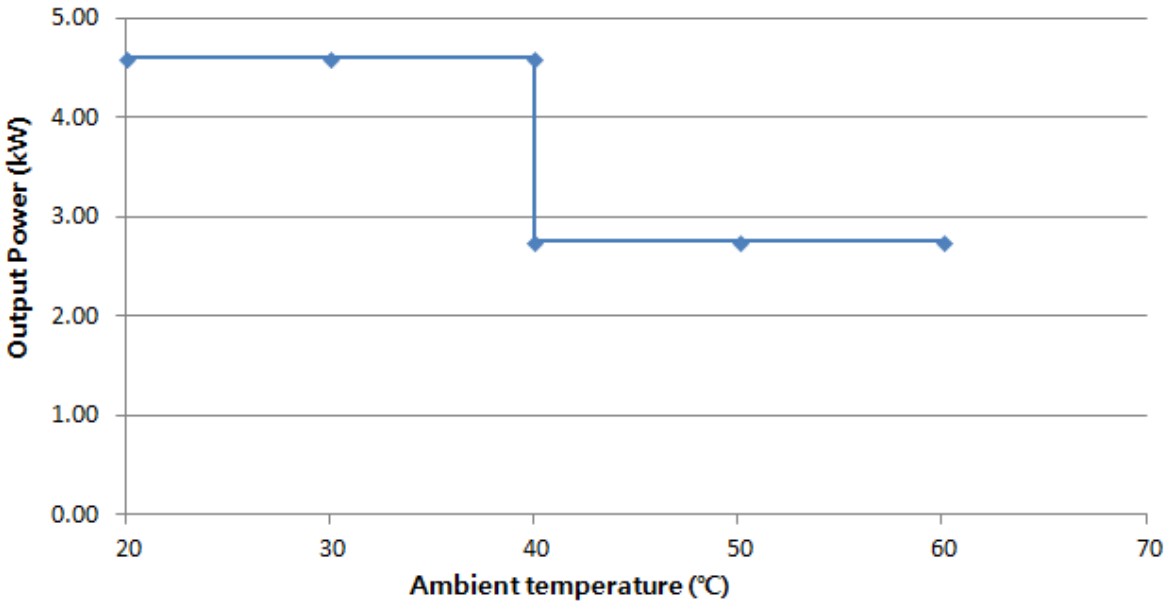
10.4.3 FAN 1 & FAN 2

In the All in One System, FAN1 and FAN2 provide air circulation for regulating system temperature. The fans can be replaced when they end their life, or in case of failure. When a

fan fails, the installer or the maintenance personnel will identify its causes, and will replace it in case of hardware failure. The replacement method will depend on the local maintenance conditions. The manufacturer's name and the model number of the fan are Minebia Manufacturing Company/DC FAN MOTOR/4710KL-04W-B59-E00. For further details, please refer to the Maintenance Manual or contact SAMSUNG SDI Service. The contact address is described in Chapter 13.

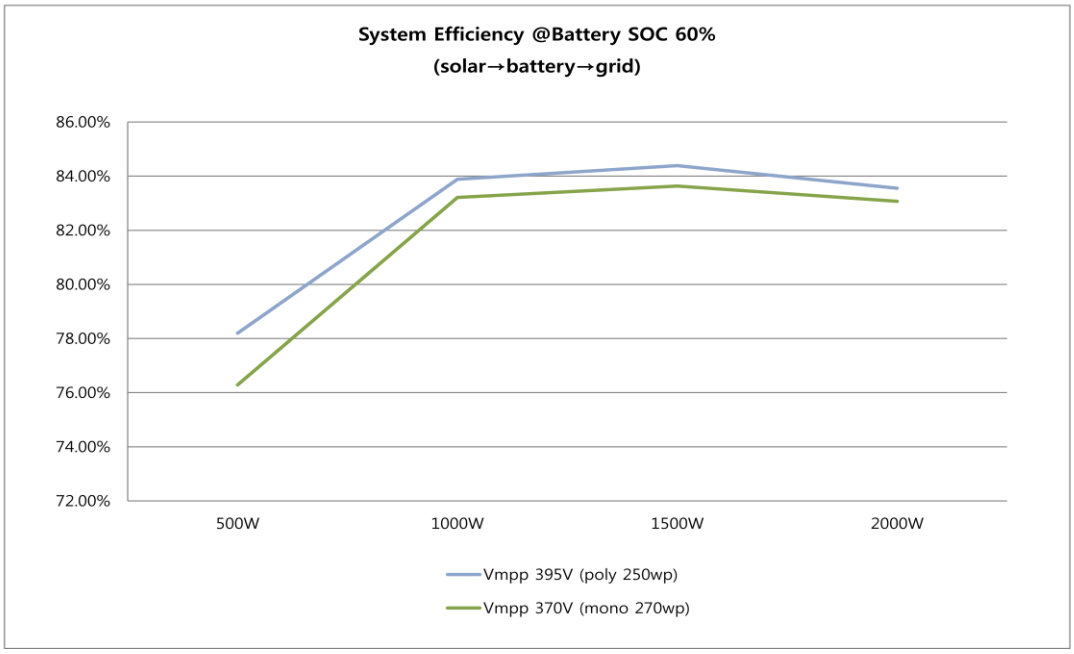
11 Technical Specifications

Rating	Units
PV input quantities:	
Vmax PV(absolute maximum)	DC 550V
PV input operating voltage range	DC 125~500V
Maximum operating PV input current per string	DC 15A
Isc PV (absolute maximum)	DC 20A
Max. inverter backfeed current to the array	0A
AC output quantities:	
Voltage (nominal or range)	AC 230V (184V ~ 264.5V)
Current (maximum continuous)	AC 25A
Current (inrush)	68.6A peak, 100us
Frequency (nominal or range)	50Hz (47.5Hz~51.5Hz)
Power (maximum continuous)	4600W or VA
Power factor ranger	0.95 ~ 1 ~ 0.95
Maximum output fault current	AC Current (peak/duration) : 420A/4ms
Maximum output overcurrent protection	AC 30A RMS
Harmonic distortion of output current (at THD<2%, P_{AC}> 0.5 P_{ACnom})	5%
AC input quantities:	
Voltage (nominal or range)	AC 230V (184V ~ 264.5V)
Current (maximum continuous)	AC 25A :
Current (inrush)	AC 68.6A peak, 100us
Frequency (nominal or range)	50Hz (47.5Hz~51.5Hz)
DC input (other than PV) quantities:	
Battery Voltage (nominal or range)	DC 60 V(nominal) : Range : 43~67V
Battery Current (nominal continuous)	DC 33.3A
Battery Current (max. continuous)	DC 46.5A
DC output (other than PV) quantities:	
Battery Voltage (nominal or range)	DC 60 V(nominal) : Range : 43~67V
Battery Current (nominal continuous)	DC 33.3A
Battery Current (max. continuous)	DC 46.5A
Other quantities:	
Protective class(I, II, III)	Class I
Ingress protection (IP) rating per part 1	IP21
AC connection	1 phase
Operating temperature	-10~40° C
Storage temperature	-20~60° C
Over voltage category	III



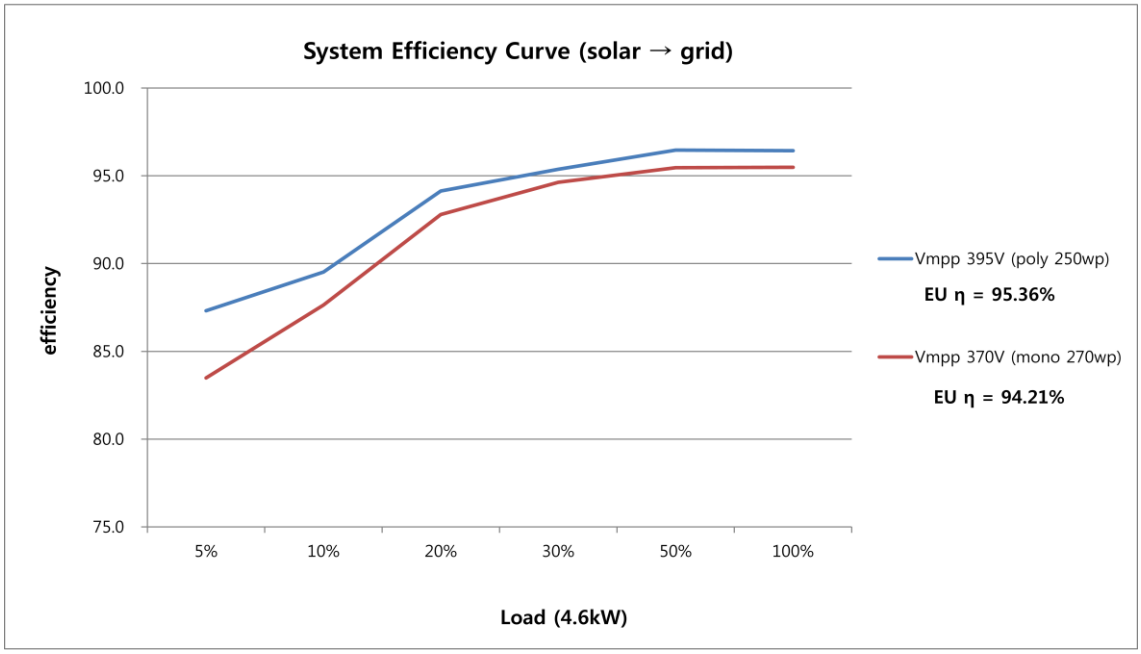
Derating Curve

System Efficiency Curve (poly 250wp, mono 270wp)



Power efficiency curve

Efficiency Curve of PV module (poly 250wp, mono 270wp)



Power efficiency curve

12 Disassembly

12.1 Disassembly

	CAUTION Risk of injury due to the heavy weight of the 3.6kWh All in One! Moving the system should be done by at least two persons.
	CAUTION Lethal hazards caused by high voltages in the 3.6kWh All in One!
	CAUTION Lethal hazards caused by voltage spikes if battery's positive and negative terminals are shorted by conductive metals. Standby for 40 minutes for complete discharge within the system.
	CAUTION When transporting the All in One system with packaged type, remove the battery tray from the All in One system and transport it separately.

12.1.1 Electric Connection Removal

Push down the DC disconnect switch in the distribution box.
Push down the AC circuit breaker in the distribution box.
Stand by for 40 minutes to complete discharge within the system.
Remove the AC connection terminal in the 3.6kWh All in One main body.
Remove the PV connection terminal in the 3.6kWh All in One main body.
Remove the communication cable from the 3.6kWh All in One.
Remove the smart meter.

12.1.2 Disassembly of 3.6kWh All in One Main Body

Check whether there is main body and external electrical / communication connection line to remove.
Remove the front case cover of the enclosure as shown in Chapter 5.
Separate the battery electrical connection connector (BATT-A: Connector on the system side, BATT-B: Connector on the battery side).
Separate the battery signal line (4 lines)
Lay the main body down. Lay it so that the tray knob is visible. Work with at least two persons (Overweight).
Unfasten the screw on the battery tray to separate from the main body.
Lift the battery tray for separation.

Place the main body and the battery tray on the packing box. This process is the reverse order of the installation process.

12.2 Packaging

Pack in the original box of the 3.6kWh All in One if possible.
If not possible, pack considering the weight of minimum 95kg.
Also, the main body must go into the box completely.

12.3 Storage

Store 3.6kWh All One in temperature conditions above -20~60° C.

12.4 Disposal

If the battery or the product life has expired, the regulations for the disposal of electronic products in that region must be followed, and if not, send to Samsung SDI. The address is indicated in the contact (Chapter 13).

13 Contact

For technical problems or inquiries for usage, please contact the installation company.
To receive customer support, the following information is required.

- Product type
- Serial Number
- Connected PV module type and number
- Option equipment

Address : 85737 Oskar-Messter-Str. 29 Ismaning (Muenchen) Germany
E-Mail : esseuservice@samsung.com

14 Appendix

Samsung SDI Limited Warranty

Product Name: 3.6kwh All in One

I. Product Warranty

1. Samsung SDI warrants that the Product[1] will be free from defects in material and workmanship under normal use in accordance with the applicable Technical Specifications for the Product.

2. The warranty period of the Product ("Product Warranty Period") is specified as follows:
   A. PCS : The warranty period shall be five (5) years from the Date of Installation[2]
   B. Battery & Enclosure : The warranty period shall be two (2) years from the Date of Installation

3. In the event that the Product should fail to conform to the Technical Specifications during the Product Warranty Period, Samsung SDI shall, at Samsung SDI's option: (i) repair the non-conforming or defective Product; or (ii) provide Buyer[3] with a replacement for the Product. Samsung SDI shall be responsible for all reasonable costs of repair or replacement in connection with such non-conforming or defective Product; provided that Buyer shall bear the costs of removing the defective Product(s) and (re) installation of the repaired or replaced Product.

II. Performance Guarantee

1. In addition to the Product Warranty, Samsung SDI guarantees performance of the Product to be maintained at least sixty five percent (65%) of initial battery's capacity, provided that the usage of the Product shall have complied with the Operating Conditions under specification for a period of ten (10) years after the Installation Date , whichever occurs earlier ("Performance Guarantee Period"). Also, Samsung SDI guarantees cycle life of 6,000cycles at room temperature 25℃.

2. About Self Discharging Degradation, Samsung SDI guarantees 180days after

[1] "Product" means the battery pack of Samsung SDI that consists of Battery, PCS, and the Enclosure.

[2] "Date of Installation" To claim any warranty hereunder, Buyer must provide the date of installation. If Buyer is unable to submit any proof of the Date of Installation, Samsung SDI will calculate the Product Warranty Period from the manufacturing date which is written on the Product's label.

[3] "Buyer" means any individual or entity that directly purchases the Product from Samsung SDI.

ex-work.

III. Limitation of Warranty

1. The warranties set forth hereunder shall not apply to Products which, in Samsung SDI's absolute judgment have been subjected to: misuse, abuse, neglect or accident; alteration, improper installation, application or removal (including but not limited to any installation, application, repair, service or removal by any party not authorized in writing by Samsung SDI); non-observance of Samsung SDI's installation, users and/or maintenance instructions; repair or modifications by someone other than an approved service technician of Samsung SDI; power failure surges, lightning, flood, fire, accidental breakage or other events outside Samsung SDI's control. Further, no warranty shall apply to any damage caused by goods to which Samsung SDI's Products are incorporated or installed into, or used together with, including any parts thereof.

2. Buyer shall promptly (but in any event within five (5) days after obtaining notice or knowledge thereof) notify Samsung SDI of any defect or other nonconformity with any of equipment warranties identified by Buyer by delivering written notice to Samsung SDI of a warranty claim. Samsung SDI shall promptly notify Buyer of any defect or other nonconformity with any of the equipment warranties identified by Samsung SDI.

3. EXCEPT AS SPECIFIED ABOVE, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, NON-INTERFERENCE, ACCURACY OF INFORMATIONAL CONTENT, OR ARISING FROM A COURSE OF DEALING, LAW, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE EXTENT ALLOWED BY APPLICABLE LAW AND ARE EXPRESSLY DISCLAIMED BY SAMSUNG SDI. TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED, SUCH WARRANTY IS LIMITED IN DURATION TO THE EXPRESS WARRANTY PERIOD. THIS DISCLAIMER AND EXCLUSION SHALL APPLY EVEN IF THE EXPRESS WARRANTY SET FORTH ABOVE FAILS OF ITS ESSENTIAL PURPOSE.

4. IN NO EVENT WILL SAMSUNG SDI BE LIABLE FOR ANY COSTS OR PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES OR FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, INDIRECT, OR PUNITIVE DAMAGES, INCLUDING WITHOUT LIMITATION LOST PROFITS, WHETHER THE CLAIM IS BASED ON CONTRACT, TORT, STRICT LIABILITY, OR ANY OTHER THEORY OF LAW OR EQUITY, EVEN IF

ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SAMSUNG SDI'S LIABILITY FROM ANY CAUSE WHATSOEVER SHALL IN NO EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE PAID BY BUYER TO SAMSUNG SDI FOR SUCH PRODUCT GIVING RISE TO THE LIABILITY.

IV. Obtaining of Warranty Service

A) The warranty provided hereunder is only applicable to the Buyer who has purchased Products directly from Samsung SDI or from the subsidiaries of Samsung SDI.

B) The return of any Products will not be accepted unless prior written authorization has been given by Samsung SDI. The written authorization should contain the Product's model name, a description of the defect and/or failure, and the serial number located on the Products label attached to the backside of the Products, and the Date of Installation.

C) In the event Samsung SDI has discontinued the manufacture of the Product in issue at the time the related warranty claim is accepted by Samsung SDI. Samsung SDI may, at its sole option, replace it with a different type of Product (of mutually agreed size, color, shape and/or power) or refund the purchase price prorated by the days of the relevant Warranty Period remaining.

V. Contact

Address : 85737 Oskar-Messter-Str. 29 Ismaning (Muenchen) Germany
E-Mail : esseuservice@samsung.com